Anchorsholme Academy Mathematics Policy

Implementation Date: July 2018
Adopted by Governors/HT:
Review period: 3 Yearly
Last review date: March 2023
Next review due by: 31 March 2026
Person responsible for policy: Miss J Eckersley

Contents

Introduction

This policy outlines the philosophy aims, organisation and management of the teaching and learning of mathematics at Anchorsholme Academy. This policy was implemented in 2018 using the New National Curriculum (NC) programmes of study (PoS) and has been reviewed and updated annually. The most recent review was March 2023.

This policy will be updated annually.

Philosophy

Mathematics is a global form of communication, used widely in society. The role of mathematics in day to day life and society mean that it is an essential set of skills for children to develop in order to become successful, independent learners and adults. In this vein, mathematics should be studied to assist development of spatial awareness, logical order, reasoning and communication. In addition to the inherent usefulness of mathematics, it should offer students, intellectual wonder, stimulation and inspiration.

Aims

Anchorsholme Academy recognises the importance of mathematics as an individual subject, as part of the wider National Curriculum and as part of the 'hidden curriculum'.

Our aims are to:

- Develop competence in mathematical knowledge, concepts and skills;
- Encourage our pupils to have confidence in their own ability;
- Challenge children appropriately;
- Provide opportunities for our pupils to describe, predict, interpret, predict and explain, recognising that mathematics can be an essential communication skill;
- Develop our pupils' ability to recognise where mathematical skills can be applied, have the confidence to do so and solve problems;
- Encourage application of mathematics across the wider curriculum and outside of school in the wider world;
- Allow students to work independently or within groups as necessary;
- Work mathematically both within and outside the classroom;
- Allow equal access to the mathematics curriculum regardless of gender, cultural or home background; and
- Ensure that children are ready to progress to the next stage of their mathematical education by the end of each year.

Curriculum Planning

As Anchorsholme Academy is a three form entry school, our belief is that each class should have a similar starting point to ensure fair and consistent coverage of objectives.

Long and Medium Term Planning

Anchorsholme Academy will use the 'White Rose Maths' resources for longer term planning. These items will be used as they effectively ensure coverage of the key areas of the National Curriculum and provide a guide for how to organise delivery of the curriculum. The NCETM Professional Development Planning resources, Trust milestones and 'Ready to Progress'

framework will also provide a range of suggestions on using and applying mathematics in wider contexts, how to effectively connect concepts within and across year groups and ensuring mathematical fluency for all pupils.

Short Term Planning

The 'White Rose Maths' planning resources will be the basis for all short term planning (from Years 1-6) as it is designed in line with National Curriculum objectives and supports lesson delivery with a mastery approach. Where staff need further planning support, the NCETM Professional Development Planning resources and Trust milestones can be used to determine the objectives to be taught and to provide a guideline for how much time should be dedicated to each objective.

- Lessons should be structured in accordance with the principles of teaching for mastery in mathematics: small progressive lesson steps, 'ping-pong' approach within lessons, a focus on appropriate use of representations and vocabulary and depth of understanding rather than breadth.
- Planning should consider lesson objectives, quality resources, differentiation (mastery-based), assessment opportunities and use of TA support.
- Abilities and additional needs of pupils (E.g., SEND) should also be addressed during planning.
- As the week evolves, planning should be reactive; each teacher should adapt and personalise lessons and activities based on the strengths and gaps in their student's knowledge.
- Teachers will be required to save planning materials or resources (e.g. a smart note book for the week that may differ to a parallel class) in their planning folder.
- Teachers may evaluate their plans in a format of their choice. Evaluations may be used to inform future teaching, learning and interventions.
- When subject leader monitoring takes place, it is the responsibility of the individual teacher to ensure planning, resources and evaluations are readily available.
- EYFS mathematics plans are topic based and bespoke to our children's needs and EYFS curriculum. Plans show differentiation and progression linked to our 'EYFS Curriculum by the Sea'. White Rose Maths EYFS teaching and learning resources are also used to support and inform teaching and learning.

Teaching of Mathematics

Organisation

- A daily mathematics lesson of 45-60 minutes – age dependent. More time may be allocated if there is a specific need e.g. to test calculation skills and review progress.
- Lessons will follow a teaching for mastery structure and will have activities and representations that suit the nature of this teaching style.
- MMM will be delivered daily for 10-15 minutes. These sessions will be used to recap mathematical fluency and reasoning skills across the curriculum. They do not have to share the same objectives as the core lesson. MMM activities should be recorded and available for review as part of book scrutiny.
- Opportunities are planned for application of mathematics across the wider curriculum.
- EYFS have daily access to a maths classroom which is resourced entirely for the provision of mathematics teaching. It promotes practical, hands on, fun learning activities to stimulate and engage the children. Focused maths and continuous provision activities are

on offer. Continuous provision across the year group ensures that a maths-based activity will be available in all classrooms, not just the 'maths classroom'.

- Interventions are to be planned and delivered by teachers or planned by teachers and delivered by a teacher or Teaching Assistant, on the same day whenever possible.

Skill Development

Progression of skills is key for ensuring pupils are confident, fluent mathematicians. To ensure progression of skills, the following will be adhered to:

- All lessons will follow the 'live marking' approach. This will ensure children have the opportunity to access different level of challenge and will also have the chance to complete reasoning and problem-solving tasks in every lesson. It also ensures that children receive immediate feedback on their learning and can seek early support when necessary.
- Fluency and understanding of mathematical concepts will be developed using concrete, pictorial and abstract representations of questions for pupils of all abilities. This is important for ensuring basic conceptual understanding of all pupils and should also allow pupils to demonstrate Greater Depth and Mastery of skills.
- Consistent use of mathematical representations across year groups to ensure connections between previous, current and future learning.
    - Example of progression from Year 1 (each counter equals 1, totaling 10 in the tens frame), to Year 4 (each counter equals 100, totaling 1000 in the frame).

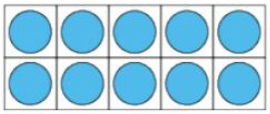


Figure 1: using a tens frame and counters

Figure 2: using a tens frame and counters

- Encouragement of use of mathematical language and sentence stems. This should allow pupils to ensure understanding of core concepts and begin to connect and apply their understanding.
    - For examples: "5 multiplied by 6 equals thirty, therefore 5 multiplied by 60 equals 300."
- Pupils should be able to make connections between different elements of their learning as specified in the 'Ready to Progress' framework.
    - For example, understanding the commutative law of multiplication and division will support children in accessing wider areas of the maths curriculum, such as working with fractions and percentages.
- Calculations policies are in place (see appendices). These outline methods for developing fluency in written and mental calculations in line with the National Curriculum.
    - Children should have a grasp of number value and number sense by playing with numbers and immersion in a variety of mental and informal methods before moving onto a structured calculation method.
    - We recognise introduction of the written methods too early can be detrimental to understanding. We believe that understanding of 'why' is equal or of greater importance to 'how'.
    - The professionalism of the class teacher will determine whether a student is ready for a written method or when.
    - Calculation policies are shared with and accessible by all staff.
- Application of skills is a regular feature of mathematics in the classroom. Children will be required to show their mathematical reasoning both orally, using diagrams and sometimes concrete resources.

- Group work may be used to support children in developing all mathematical skills. This will include reasoning activities. More able children may also use group work to model good practice and provide evidence towards a 'Greater Depth' judgment of their achievement.
- Fluency of times tables recall will be a priority for all children from Year 2-6 to supplement key areas of the wider curriculum (see appendices).
- Computing may be used as appropriate to further challenge the learning, consolidate new skills and or increase speed and confidence in a specific mathematical skill.

Learning Environment

The classroom environment should support the teaching and learning of mathematics. This is ensured with the following measures:

- Within the classroom, working walls support learning and teaching of a series of lessons. These displays are the 'workshop' of the classroom where the students should use them as an independent learning tool. They may have models, representations, interactive questions and vocabulary. They can also celebrate success to motivate other learners.
- In the corridors or the classroom, a WAGOLL display may be used to demonstrate correct methodology or reasoning and inspire learners.
- Displays should also celebrate achievement – e.g. 'Times Tables Rockstars' to demonstrate and praise multiplication tables competence.

Assessment, Reporting and Recording

Assessment of mathematics occurs at three levels: short-term, medium-term and long-term. These assessments are used to inform teaching in a continuous cycle of planning, teaching and assessment.

Short-Term Assessment:

- Class teachers will assess children's understanding daily/weekly through: observation, questioning, discussion and homework. These will inform feedback to the students and the route of the day-to-day learning progress.
- EYFS teachers observe children's development in all aspects of maths and record evidence through annotated photographs in workbooks, written observations and post-its of children's quotes. The children also have an individual electronic learning journal, "Tapestry", on which all photographs and developmental judgments are saved. Parents have access to their own child's learning journal. These recordings will become part of the pupil profile evidence.
- KS1 and KS2 teachers' record of assessment may be made on the plan for the class, in a learning journal, record book or in another clear and accessible format.
- Children may be asked a 'Now Try' question following their work to assess understanding of that day's objectives to assess mastery of another skill taught earlier in the year.
- Questions demonstrating fluency, reasoning and problem solving are used within teaching and marking to help inform formative assessment.
- Live marking in lessons means that children are gaining in lesson feedback every day, allowing for quick response intervention and support.
- As work is assessed live in each lesson, teachers will not be required to retrospectively mark. They can indicate FA through marking codes by the objectives: two ticks for secure understanding, one tick for partial understanding and a dot for limited understanding.
- Next step questioning can be used in marking to help review learning over the week.

- Pupils will also be taught to evaluate, peer and self-assess their achievements through whole class marking, and one-to-one feedback.

Medium & Long Term Assessments:

- The White Rose Maths End of Unit assessments are available to use as a formative assessment tool.
- At the end of each half term, children will complete the Star Maths assessments from Renaissance. Once these assessments have been completed, the resulting gap analysis informs planning, teaching and intervention. It should also assist teachers in their planning for the start of the following curriculum year. Star Assessments are used alongside formative assessments to inform summative judgments at Christmas, Easter and Summer, thus creating a record of progress and attainment. This is recorded on Arbour.
- In Years 2 and 6, SATs data provides evidence of attainment and progress. The data is recorded on Arbour.
- Teachers will also be required to assess and track progress of times tables knowledge and recall for pupils from Years 2-6 (Times Tables Policy: see appendices).
- In EYFS, baseline assessments are made in the Autumn term and an assessment tracker is updated each term to provide summative judgements. At the end of EYFS, children are assessed against the ELGs for Number and Numerical Pattern.
- Assessment data will be used by the mathematics subject leader to inform whole school progression and feed back to Senior Leadership.

Intervention

Teachers will react swiftly to any signs of children falling behind or data indicating underachievement at any level. As part of mathematics lessons, a teacher or TA may work with a focus group for a short time on a specific, identified area of misconception.

A teacher or TA may also work with a group outside of a mathematics lesson to address a specific learning gap. Whenever possible, this intervention will take place on the same day that an issue is identified.

If a TA works with a group, they should inform the teacher of any observations noted with regard to progress or particular areas of difficulty.

Recording of interventions may differ across classes. However, any interventions will be recorded. This may be on the weekly plan or NTP record sheets, in a learning journal, maths books or in an intervention file. All records should be accessible for moderation if required.

Equal Opportunities & Inclusion

In line with our Equality Policy, all members of Anchorsholme Academy are treated as individuals. We meet the needs of all pupils, regardless of gender, ability, ethnicity, culture, religion, language, sexual orientation, age, special educational needs and disability and social circumstances.

In line with our British Values Policy, all staff are aware of the need for the curriculum to reflect cultural diversity and the need to prepare pupils for life in a diverse and multi-faith society.

At Anchorsholme Academy, all students will have equal opportunity to reach their full, realistic potential across the mathematics curriculum. We believe in 'teaching to the top' and differentiation by question, resources, grouping and finally, task. For students who consistently experience difficulty with the core, age-appropriate curriculum, for example pupils with SEND, the class teacher will be required to determine the level at which the student can access. Any children with an EHCP for mathematics will be on the SENDCo database. Targets will be decided upon based upon teacher assessment and skill acquisition.

Work will be differentiated to provide ability appropriate challenge.

The 'Ready to Progress' framework will be used to ensure that children are able to access the fundamentals of the curriculum ready for progression into subsequent year groups.

Home Links

We recognise that parents are children's first and most enduring educators and we value highly the contribution they make. We actively encourage and support our parents in the development of their children as learners.

Throughout the year, each year group will inform the parents of what topics are upcoming and any materials that they may engage with that would enhance the learning that takes place at school. This may be done through Teaching Overviews, Class Dojo/Tapestry and bi-annual Parents' Evenings.

Year 6 students are actively encouraged to use CGP Mathematics and English notes. We operate an open-door policy and the subject leader is available for 'drop-ins' to assist with any parental concerns or questions regarding mathematics.

Homework

Mathematics homework is provided on a regular basis. However, for specific groups of children, daily practice may be required as identified from AfL by a class teacher.

Homework will be used to facilitate:

- Practice and consolidation of skills;
- Extension of skills and concepts;
- Open-ended reasoning challenges;
- Opportunity to share mathematics with the family; and
- Preparation for future learning.

Appendix A
White Rose Maths Planning
K:\Maths\WRM Planning Overviews

Appendix B
NCETM Planning Resources
K:\Maths\NCETM Mastery Resources

Appendix C
Trust Maths Milestones
K:\Maths\Planning 2021-22\Maths Progression Document.docx

Appendix C (1)
EYFS Trust Maths Milestones
K:\Maths\Planning 2021-22\Sea View Trust EYFS Milestones.docx

Appendix D
Ready to Progress Framework
Ready to Progress Framework.pdf

Appendix E (1)
Calculations Policies
Addition

Progression Towards a Written Method for Addition

In developing a written method for addition, it is important that children understand the concept of addition, in that it is:

- Combining two or more groups to give a total or sum
- Increasing an amount

They also need to understand and work with certain principles, i.e. that it is:

- The inverse of subtraction
- Commutative i.e. 5 + 3 = 3 + 5
- Associative i.e. 5 + 3 + 7 = 5 + (3 + 7)

The fact that it is commutative and associative means that calculations can be rearranged, e.g. 4 + 13 = 17 is the same as 13 + 4 = 17.

EYFS

Early Learning Goal:

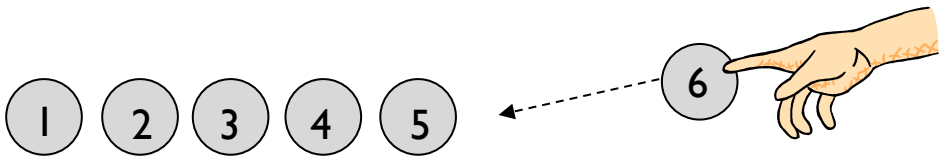
Using quantities and objects, children add two single-digit numbers and count on to find the answer.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of practical equipment, including small world play, role play, counters, cubes etc.

Counting all method

Children will begin to develop their ability to add by using practical equipment to count out the correct amount for each number in the calculation and then combine them to find the total. For example, when calculating 4 + 2, they are encouraged to count out four counters and count out two counters.

To find how many altogether, touch and drag them into a line one at a time whilst counting.

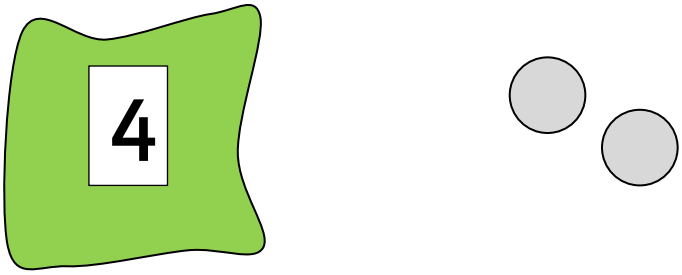


By touch counting and dragging in this way, it allows children to keep track of what they have already counted to ensure they don't count the same item twice.

Counting on method

To support children in moving from a counting all strategy to one involving counting on, children should still have two groups of objects but one should be covered so that it cannot be counted. For example, when calculating 4 + 2, count out the two groups of counters as before.

then cover up the larger group with a cloth.



For most children, it is beneficial to place the digit card on top of the cloth to remind the children of the number of counters underneath. They can then start their count at 4, and touch count 5 and 6 in the same way as before, rather than having to count all of the counters separately as before.

Those who are ready may record their own calculations.

YEAR 1

End of Year Objective:

Add one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

Children will continue to use practical equipment, combining groups of objects to find the total by counting all or counting on. Using their developing understanding of place value, they will move on to be able to use Base 10 equipment to make teens numbers using separate tens and units.

For example, when adding 11 and 5, they can make the 11 using a ten rod and a unit.

The units can then be combined to aid with seeing the final total, e.g.

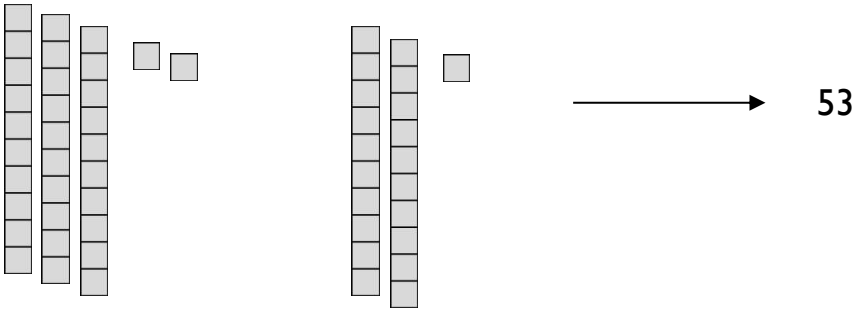
so 11 + 5 = 16. If possible, they should use two different colours of base 10 equipment so that the initial amounts can still be seen.

YEAR 2

End of Year Objective:

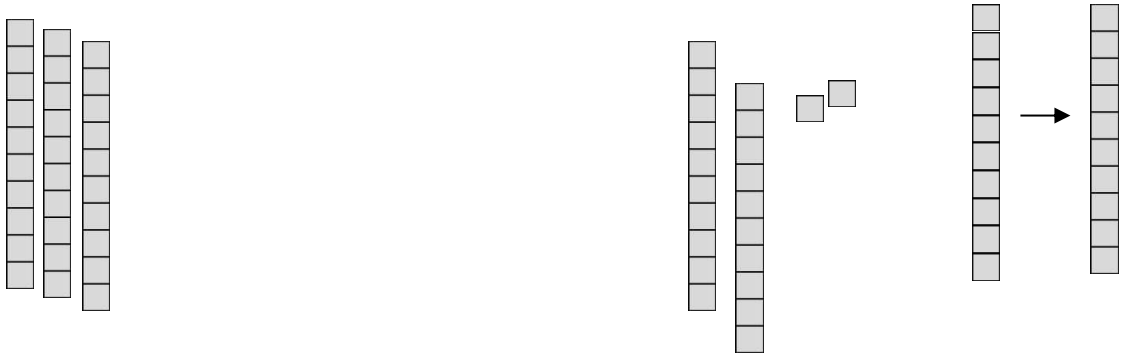
Add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; three one-digit

Children will continue to use the Base 10 equipment to support their calculations. For example, to calculate 32 + 21, they can make the individual amounts, counting the tens first and then count on the units.

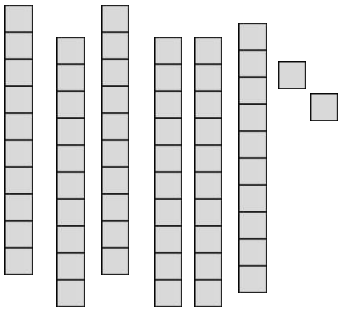


When the units total more than 10, children should be encouraged to exchange 10 units/ones for 1 ten. This is the start of children understanding 'carrying' in vertical addition. For example, when calculating 35 + 27, they can represent the amounts using Base 10 as shown:

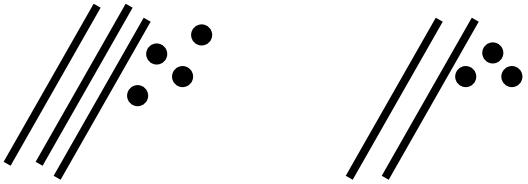
Then, identifying the fact that there are enough units/ones to exchange for a ten, they can carry out this exchange:



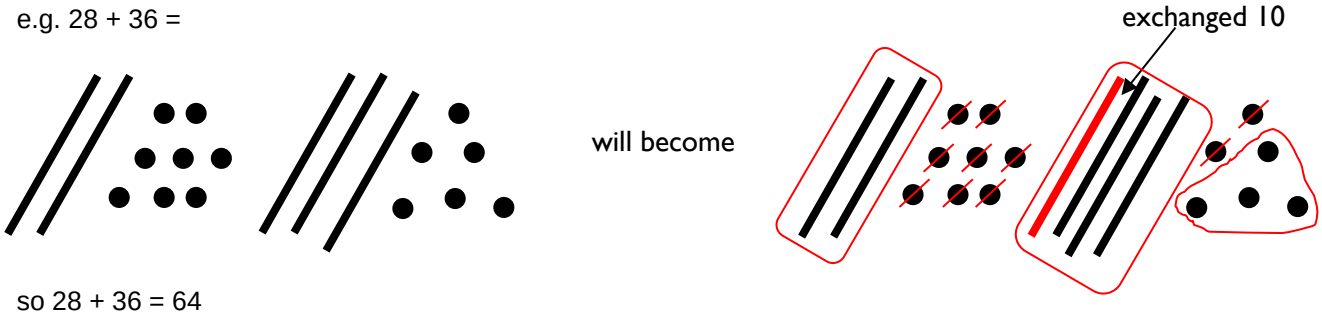
To leave:



Children can also record the calculations using their own drawings of the Base 10 equipment (as slanted lines for the 10 rods and dots for the unit blocks).
e.g. 34 + 23 =



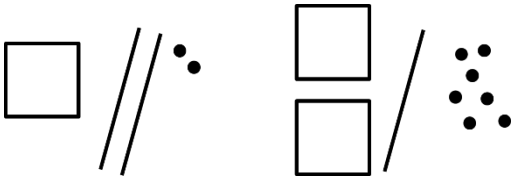
With exchange:
e.g. 28 + 36 =



so 28 + 36 = 64

It is important that children circle the remaining tens and units/ones after exchange to identify the amount remaining.

This method can also be used with adding three digit numbers, e.g. 122 + 217 using a square as the representation of 100.



YEAR 3

End of Year Objective: **Add numbers with up to three digits, using formal written method of columnar addition.***

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study."*

It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

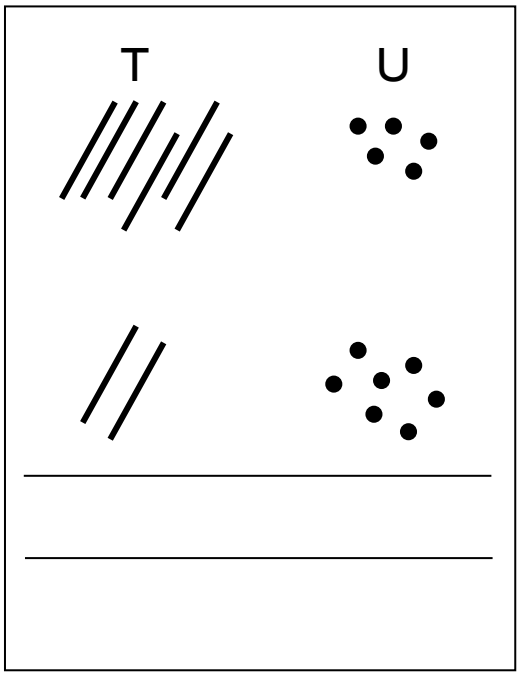
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange.

Children should add the **least significant digits** first (i.e. start with the units/ones), and in an identical method to that from year 2, should identify whether there are greater than ten units which can be exchanged for one ten.

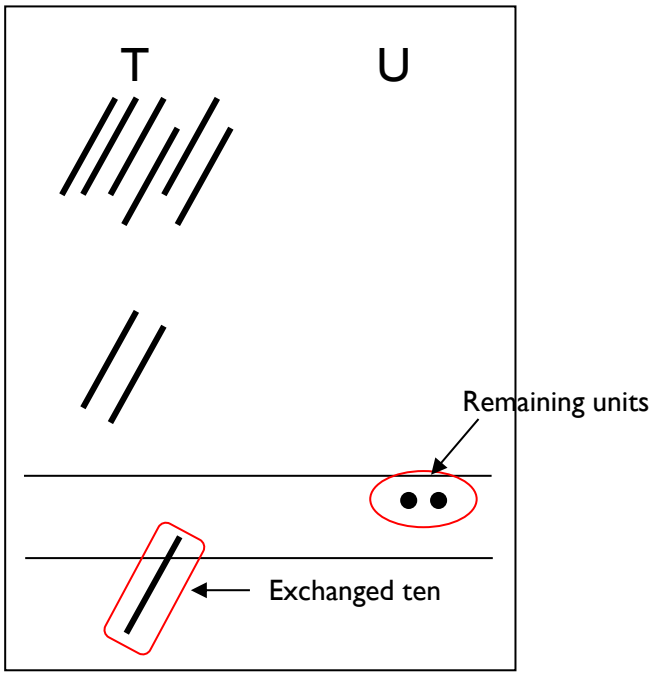
They can use a place value grid to begin to set the calculation out vertically and to support their knowledge of exchange between columns (as in Step 1 in the diagram below).

e.g. 65 + 27

Step 1



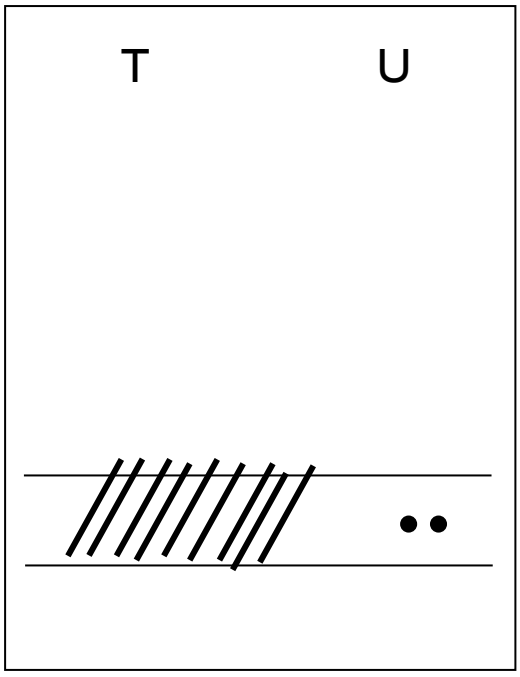
Step 2



Children would exchange ten units/ones for a ten, placing the exchanged ten below the equals sign. Any remaining units/ones that cannot be exchanged for a ten move into the equals sign as they are the units part of the answer (as in the diagram in Step 2 above).

If there are any tens that can be exchanged for a hundred, this can be done next. If not, the tens move into the equals sign as they are the tens part of the answer (as in the diagram in Step 3 below).

Step 3



Written method

Step 1

	T	U
	6	5
+	2	7

Step 2

	T	U
	6	5
+	2	7
		2
	1	

Step 3

	T	U
	6	5
+	2	7
	9	2
	1	

Children should utilise this practical method to link their understanding of exchange to how the column method is set out. Teachers should model the written method alongside this practical method initially.

This should progress to children utilising the written and practical methods alongside each other and finally, and when they are ready, to children utilising just the written method.

By the end of year 3, children should also extend this method for three digit numbers.

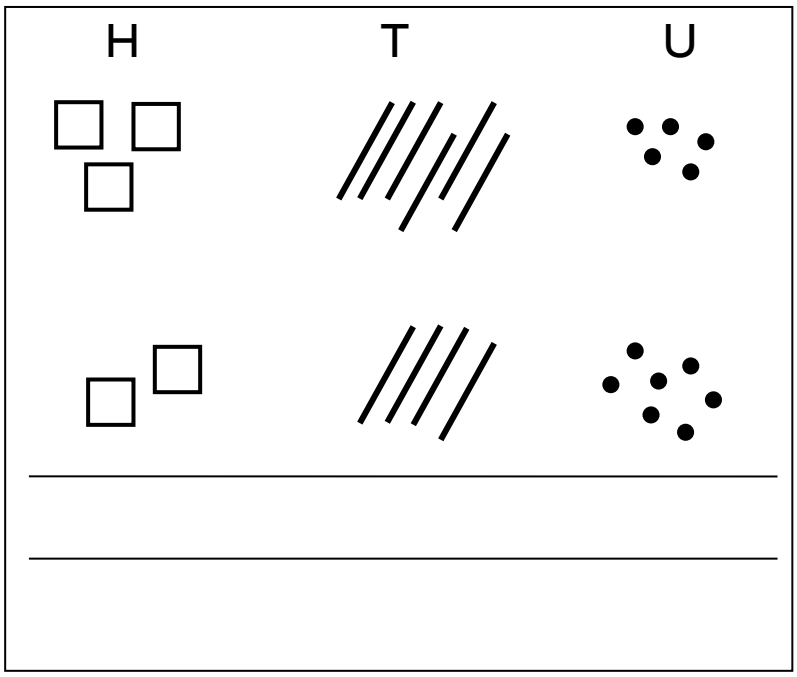
YEAR 4

End of Year Objective:

Add numbers with up to 4 digits *and decimals with one decimal place* using the formal written method of columnar addition where appropriate.

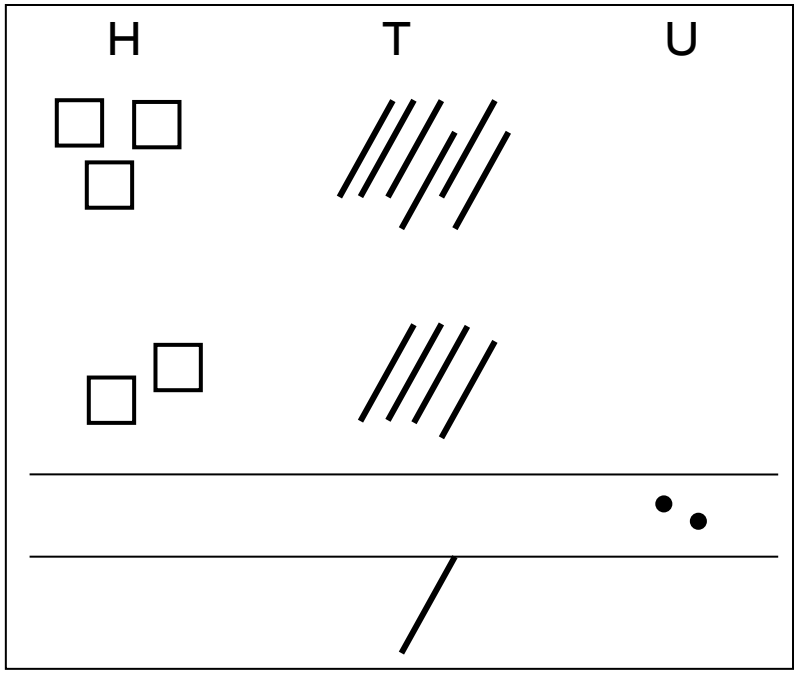
Children will move to year 4 using whichever method they were using as they transitioned from year 3.

Step 1



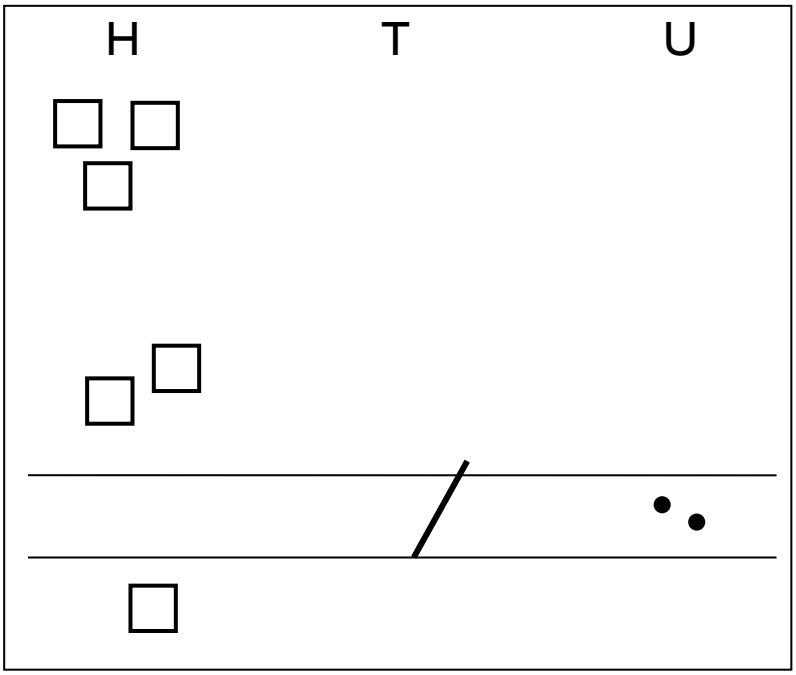
	H	T	U
	3	6	5
+	2	4	7

Step 2



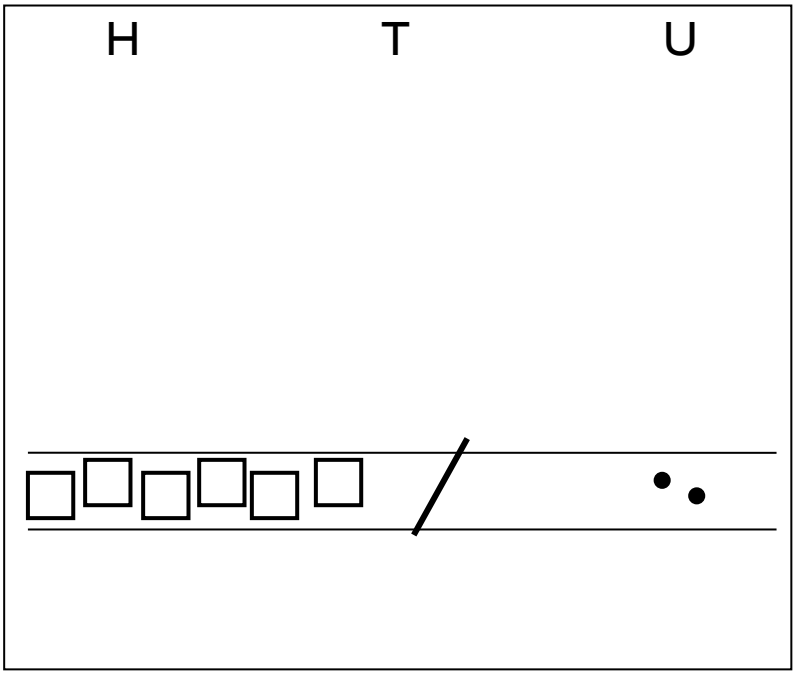
	H	T	U
	3	6	5
+	2	4	7
			2
			1

Step 3



	H	T	U
	3	6	5
+	2	4	7
		1	2
	1	1	

Step 4



	H	T	U
	3	6	5
+	2	4	7
	6	1	2
	1	1	

By the end of year 4, children should be using the written method confidently and with understanding. They will also be adding:

- several numbers with different numbers of digits, understanding the place value;
- *decimals with one decimal place, knowing that the decimal points line up under one another.*

YEAR 5

End of Year Objective:

Add whole numbers with more than 4 digits *and decimals with two decimal places*, including formal written methods (columnar addition).

Children should continue to use the carrying method to solve calculations such as:

```
  3 3 6 4
+   2 4 7
-------
  3 6 1 1
-------
    1 1
```

```
    3 1 2 1
      3 7
+   1 4 8
---------
  3 3 0 6
---------
    1 1
```

```
  3 . 5 6
+ 2 . 4 7
---------
  6 . 0 3
---------
    1
```

They will also be adding:

- several numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with each number having the same number of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another

YEAR 6

End of Year Objective:

Add whole numbers and decimals using formal written methods (columnar addition).

Children should extend the carrying method and use it to add whole numbers and decimals with any number of digits.

```
      4 2
  6 4 3 2
    7 8 6
        3
+   4 6 8 1
```

```
  4 0 1 . 2 0
    2 6 . 8 5
+     0 . 7 1
-------------
  4 2 8 . 7 6
-------------
    1
```

When adding decimals with different numbers of decimal places, children should be taught and encouraged to make them the same through identification that 2 tenths is the same as 20 hundredths, therefore, 0.2 is the same value as 0.20.

They will also be adding:

- several numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with mixed numbers of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another.

Appendix E (2)
Calculations Policies
Subtraction

Progression Towards a Written Method for Subtraction

In developing a written method for subtraction, it is important that children understand the concept of subtraction, in that it is:

- Removal of an amount from a larger group (take away)
- Comparison of two amounts (difference)

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of addition
- not commutative i.e. 5 - 3 is not the same as 3 - 5
- not associative i.e. 10 - 3 - 2 is not the same as 10 - (3 - 2)

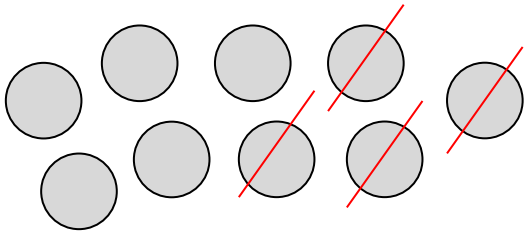
EYFS

Early Learning Goal:

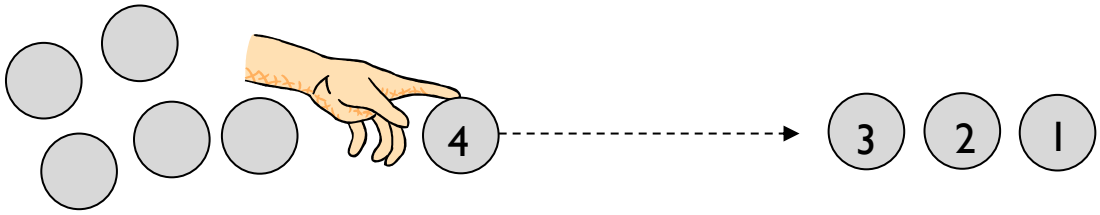
Using quantities and objects, children subtract two single-digit numbers and count on or back to find the answer.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of practical equipment, including small world play, role play, counters, cubes etc.

Taking away
Children will begin to develop their ability to subtract by using practical equipment to count out the first number and then remove or take away the second number to find the solution by counting how many are left e.g. 9 – 4.



For illustration purposes, the amount being taken away are show crossed out. Children would be encouraged to physically remove these using touch counting.



By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch count the amount that are left to find the answer.

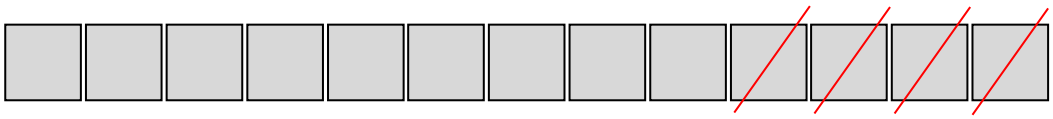
Those who are ready may record their own calculations.

YEAR 1

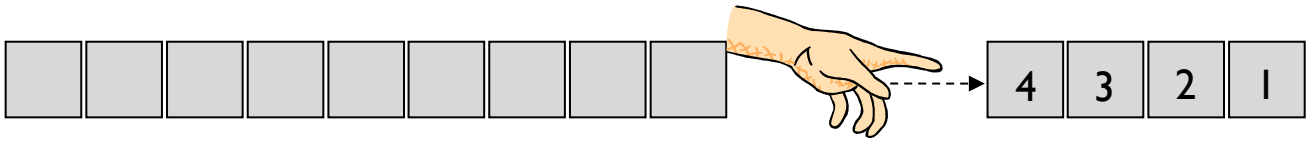
End of Year Objective:

Subtract one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

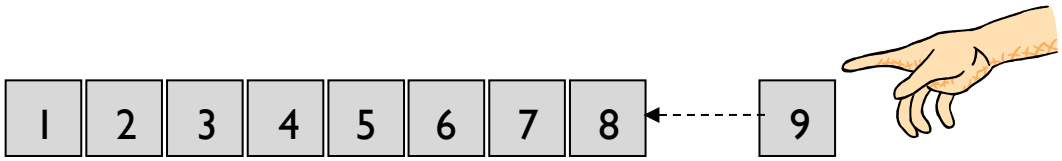
Children will continue to use practical equipment and taking away strategies. To avoid the need to exchange for subtraction at this stage, it is advisable to continue to use equipment such as counters, cubes and the units from the Base 10 equipment, but not the tens, e.g. 13 - 4



Touch count and remove the number to be taken away, in this case 4.



Touch count to find the number that remains.

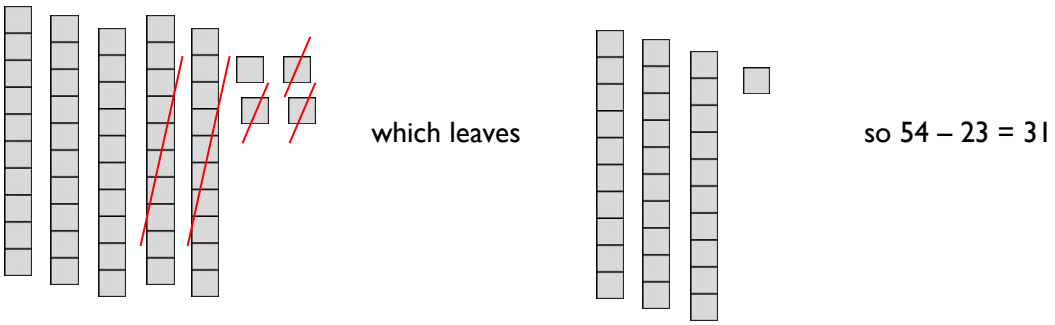


YEAR 2

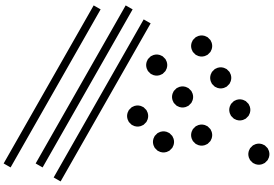
End of Year Objective:

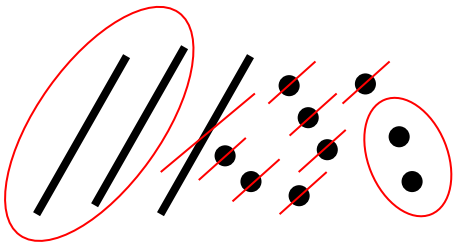
Subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers.

Children will begin to use the Base 10 equipment to support their calculations, still using a take away, or removal, method. They need to understand that the number being subtracted does not appear as an amount on its own, but rather as part of the larger amount. For example, to calculate 54 - 23, children would count out 54 using the Base 10 equipment (5 tens and 4 units). They need to consider whether there are enough units/ones to remove 3, in this case there are, so they would remove 3 units and then two tens, counting up the answer of 3 tens and 1 unit to give 31.



Children can also record the calculations using their own drawings of the Base 10 equipment (as slanted lines for the 10 rods and dots for the unit blocks), e.g. to calculate 39 – 17 children would draw 39 as 3 tens (lines) and 4 units (dots) and would cross out 7 units and then one ten, counting up the answer of 2 tens and 2 units to give 22.

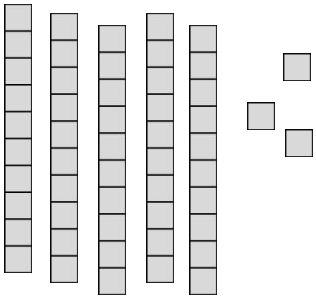




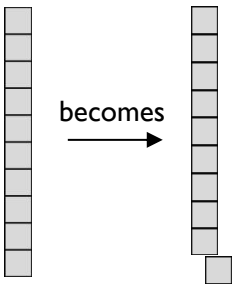
Circling the tens and units that remain will help children to identify how many remain.

When the amount of units to be subtracted is greater than the units in the original number, an exchange method is required. This relies on children's understanding of ten units being an equivalent amount to one ten. To calculate 53 – 26, by using practical equipment, they would count out 53 using the tens and units, as in Step 1. They need to consider whether there are enough units/ones to remove 6. In this case there are not so they need to exchange a ten into ten ones to make sure that there are enough, as in step 2.

Step 1

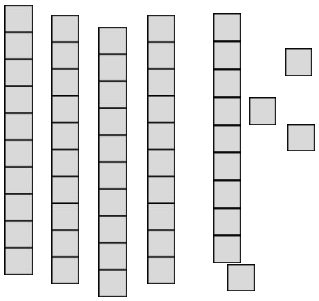


Step 2

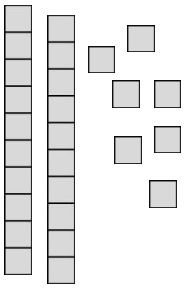


The children can now see the 53 represented as 40 and 13, still the same total, but partitioned in a different way, as in step 3 and can go on to take away the 26 from the calculation to leave 27 remaining, as in Step 4.

Step 3

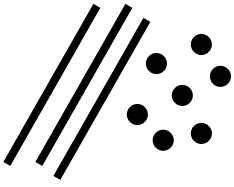


Step 4

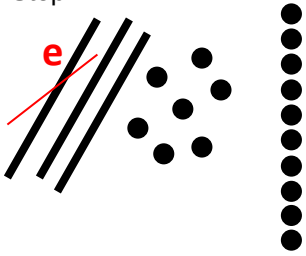


When recording their own drawings, when calculating 37 – 19, children would cross out a ten and exchange for ten units. The exchanged ten is denoted with an e so children recognise this has not been subtracted. Drawing the units in a vertical line, as in Step 2, ensures that children create ten ones and do not get them confused with the units that were already in place.

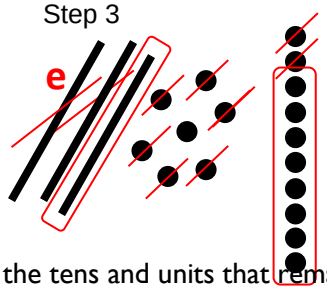
Step 1



Step 2



Step 3



Circling the tens and units that remain will help children to identify how many remain.

YEAR 3

End of Year Objective:

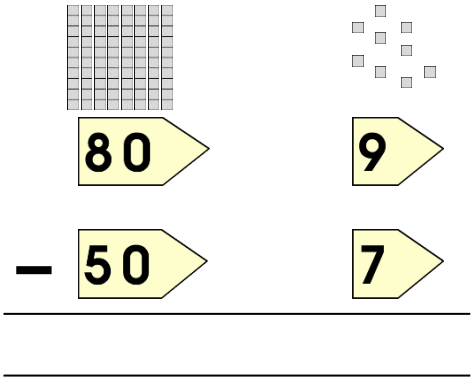
Subtract numbers with up to three digits, using formal written method of columnar subtraction.*

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study."*

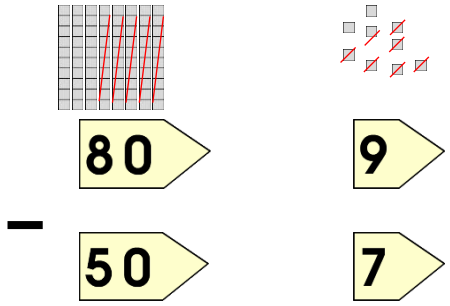
It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

Children will build on their knowledge of using Base 10 equipment from year 2 and continue to use the idea of exchange. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to represent the first number, removing the units and tens as appropriate (as with the more informal method in year 2).

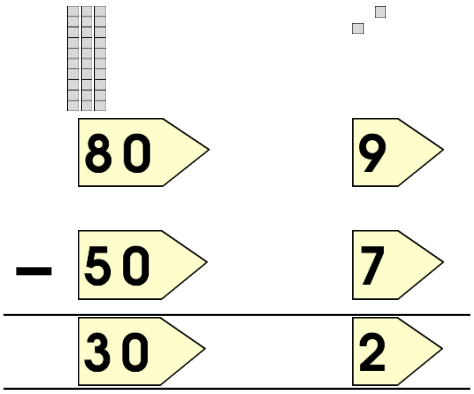
Step 1



Step 2



Step 3



Emphasise that the second (bottom) number is being subtracted from the first (top) number rather than the lesser number from the greater.

This will be recorded by the children as:

80 → 9

\- 50 → 7

30 → 2 = 32

Children can also use jottings of the Base 10 materials (as in year 2) to support with their calculation, as in the example below.

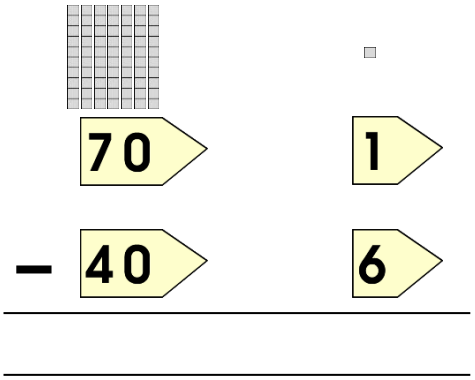
80 → 9

\- 50 → 7

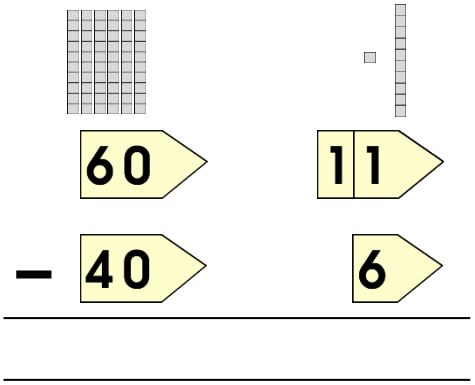
30 → 2 = 32

From this the children will begin to solve problems which involve exchange. Children need to consider whether there are enough units/ones to remove 6. In this case there are not (Step 1) so they need to exchange a ten into ten ones to make sure that there are enough, as they have been doing in the method for year 2 (Step 2). They should be able to see that the number is just partitioned in a different way, but the amount remains the same (71 = 70 + 1 = 60 + 11).

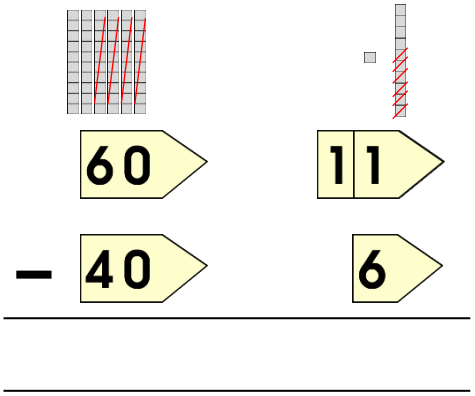
Step 1



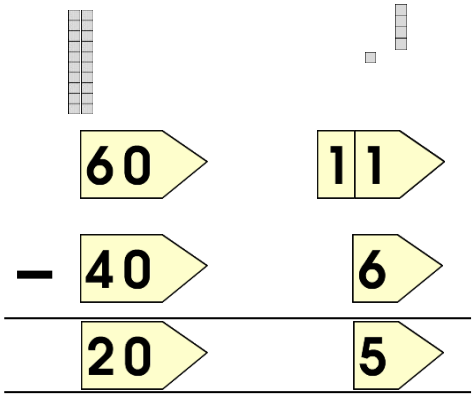
Step 2



Step 3



Step 4



This will be recorded by the children as:

60
70 → ^{1}1
\- 40 → 6
20 → 5 = 25

By the end of year 3, children should also extend this method for three digit numbers.

YEAR 4

End of Year Objective:

Subtract numbers with up to 4 digits *and decimals with one decimal place* using the formal written method of columnar subtraction where appropriate.

Children will move to year 4 using whichever method they were using as they transitioned from year 3.

Step 1

	700	→ 50	→ 4	
-	200	→ 80	→ 6	

Step 2 (exchanging from tens to units)

		40		
	700	→ 50	→ 14	
-	200	→ 80	→ 6	

Step 3 (exchanging from hundreds to tens)

	600	140		
	700	→ 50	→ 14	
-	200	→ 80	→ 6	

Step 4

	600	140			
	700	→ 50	→ 14		
-	200	→ 80	→ 6		
	400	→ 60	→ 8	=	468

This would be recorded by the children as:

	600	140			
	700	→ 50	→ 14		
-	200	→ 80	→ 6		
	400	→ 60	→ 8	=	468

When children are ready, this leads on to the compact method of decomposition:

		6	14	
	4	7	5	14
-	3	2	8	6
	1	4	6	8

By the end of year 4, children should be using the written method confidently and with understanding. They will also be subtracting:

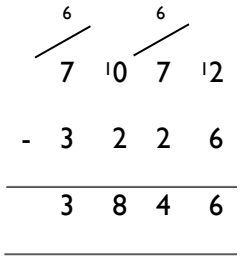
- numbers with different numbers of digits, understanding the place value;
- *decimals with one decimal place, knowing that the decimal points line up under one another.*

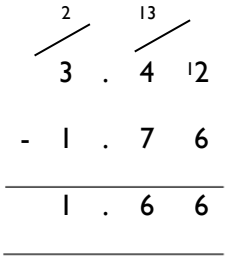
YEAR 5

End of Year Objective:

Subtract whole numbers with more than 4 digits *and decimals with two decimal places*, including formal written methods (columnar subtraction).

Children should continue to use the decomposition method to solve calculations such as:





They will also be subtracting:

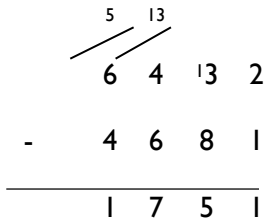
- numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with each number having the same number of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another

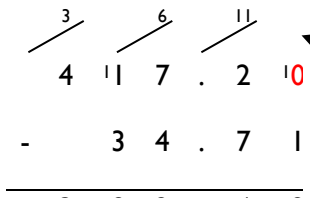
YEAR 6

End of Year Objective:

Subtract whole numbers and decimals using formal written methods (columnar subtraction).

Children should extend the decomposition method and use it to subtract whole numbers and decimals with any number of digits.





When subtracting decimals with different numbers of decimal places, children should be taught and encouraged to make them the same through identification that 2 tenths is the same as 20 hundredths, therefore, 0.2 is the same value as 0.20.

They will also be subtracting:

- numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with mixed numbers of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another.

Appendix E (3)
Calculations Policies
Multiplication

Progression Towards a Written Method for Multiplication

In developing a written method for multiplication, it is important that children understand the concept of multiplication, in that it is:

- repeated addition

They should also be familiar with the fact that it can be represented as an array

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of division
- commutative i.e. 5 x 3 is the same as 3 x 5
- associative i.e. 2 x 3 x 5 is the same as 2 x (3 x 5)

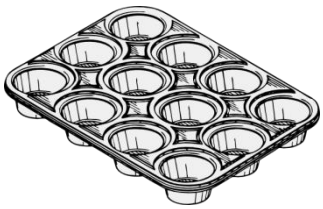
EYFS

Early Learning Goal:

Children solve problems, including doubling.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, including small world play, role play, counters, cubes etc.

Children may also investigate putting items into resources such as egg boxes, ice cube trays and baking tins which are arrays.



They may develop ways of recording calculations using pictures, etc.

A child's jotting showing the fingers on each hand as a double.

A child's jotting showing double three as three cookies on each plate.

YEAR 1

End of Year Objective:

Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

In year one, children will continue to solve multiplication problems using practical equipment and jottings. They may use the equipment to make groups of objects. Children should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc. and use this in their learning, answering questions such as 'How many eggs would we need to fill the egg box? How do you know?'

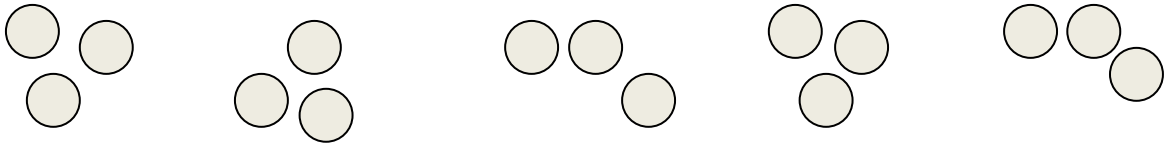
YEAR 2

End of Year Objective:

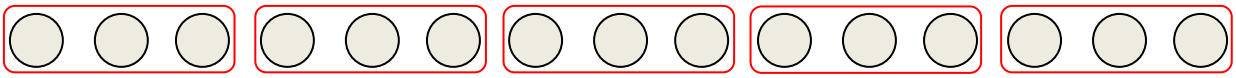
Calculate mathematical statements for multiplication *(using repeated addition)* and write them using the multiplication (x) and equals (=) signs.

Children should understand and be able to calculate multiplication as repeated addition, supported by the use of practical apparatus such as counters or cubes. e.g.

5 x 3 can be shown as five groups of three with counters, either grouped in a random pattern, as below:

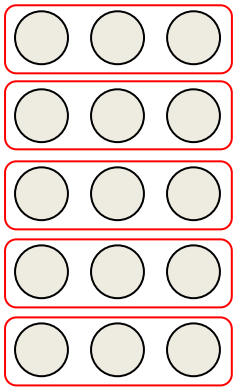


or in a more ordered pattern, with the groups of three indicated by the border outline:

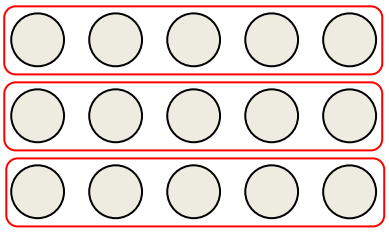


Children should then develop this knowledge to show how multiplication calculations can be represented by an array, (this knowledge will support with the development of the grid method in the future). Again, children should be encouraged to use practical apparatus and jottings to support their understanding, e.g.

5 x 3* can be represented as an array in two forms (as it has commutativity):



3 + 3 + 3 + 3 + 3 = 15



5 + 5 + 5 = 15

*For mathematical accuracy 5 x 3 is represented by the second example above, rather than the first as it is five, three times. However, because we use terms such as 'groups of' or 'lots of', children are more familiar with the initial notation. Once children understand the commutative order of multiplication the order is irrelevant).

YEAR 3

End of Year Objective:

Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to formal written methods.*

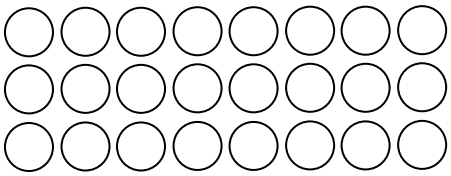
**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study."*

It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

Initially, children will continue to use arrays where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

3 x 8

They may show this using practical equipment:



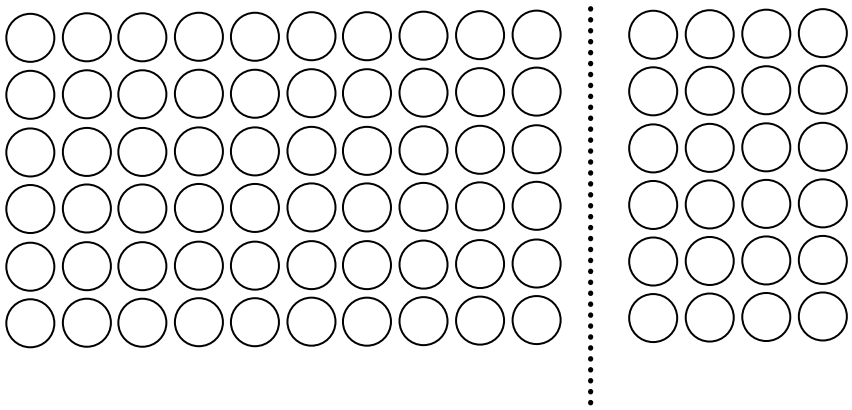
3 x 8 = 8 + 8 + 8 = 24

or by jottings using squared paper:

	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	

3 x 8 = 8 + 8 + 8 = 24

As they progress to multiplying a two-digit number by a single digit number, children should use their knowledge of partitioning two digit numbers into tens and units/ones to help them. For example, when calculating 14 x 6, children should set out the array, then partition the array so that one array has ten columns and the other four.



Partitioning in this way, allows children to identify that the first array shows 10 x 6 and the second array shows 4 x 6. These can then be added to calculate the answer:

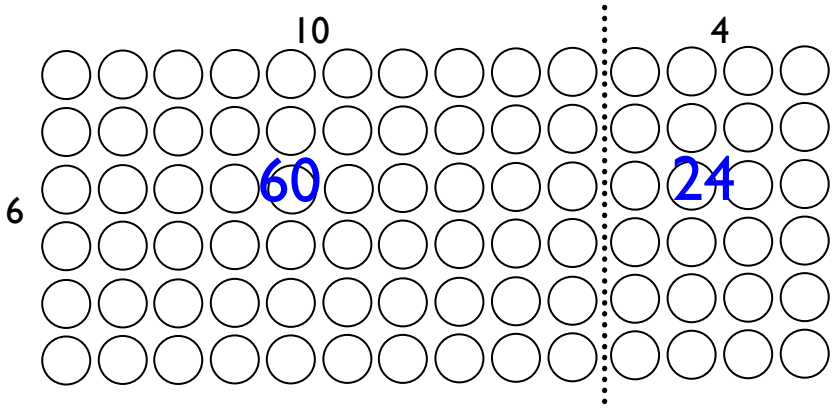
(6 x 10) + (6 x 4)

= 60 + 24

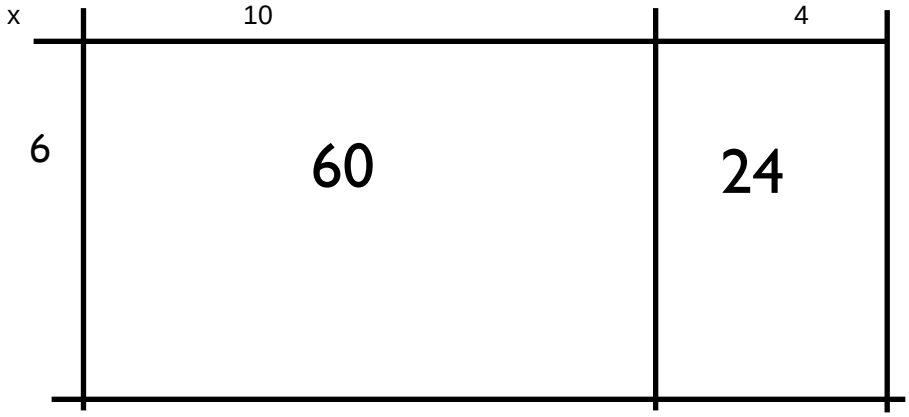
= 84

NB There is no requirement for children to record in this way, but it could be used as a jotting to support development if needed.

This method is the precursor step to the grid method. Using a two-digit by single digit array, they can partition as above, identifying the number of rows and the number of columns each side of the partition line.



By placing a box around the array, as in the example below, and by removing the array, the grid method can be seen.



It is really important that children are confident with representing multiplication statements as arrays and understand the rows and columns structure before they develop the written method of recording.

From this, children can use the grid method to calculate two-digit by one-digit multiplication calculations, initially with two digit numbers less than 20. Children should be encouraged to set out their addition in a column at the side to ensure the place value is maintained. When children are working with numbers where they can confidently and correctly calculate the addition mentally, they may do so.

13 x 8

x	10	3
8	80	24

80
\+ 24
104

When children are ready, they can then progress to using this method with other two-digit numbers.

37 x 6

x	30	7
6	180	42

180
\+ 42
222

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

YEAR 4

End of Year Objective:

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

Children will move to year 4 using whichever method they were using as they transitioned from year 3. They will further develop their knowledge of the grid method to multiply any two-digit by any single-digit number, e.g.

79 x 8

x	70	9
8	560	72

560
\+ 72
632

To support the grid method, children should develop their understanding of place value and facts that are linked to their knowledge of tables. For example, in the calculation above, children should use their knowledge that 7 x 8 = 56 to know that 70 x 8 = 560.

By the end of the year, they will extend their use of the grid method to be able to multiply three-digit numbers by a single digit number, e.g.

346 x 8

x	300	40	6
8	2400	320	48

2400
\+ 320
\+ 48
2768

When children are working with numbers where they can confidently and correctly calculate the addition (or parts of the addition) mentally, they may do so.

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

YEAR 5

End of Year Objective:

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.

Children should continue to use the grid method and extend it to multiplying numbers with up to four digits by a single digit number, e.g.

4346 x 8

x	4 000	300	40	6
8	32 000	2400	320	48

32000
\+ 2400
\+ 320
\+ 48
34768

and numbers with up to four digits by a two-digit number, e.g.

2693 x 24

x	2000	600	90	3
20	40000	12000	1800	60
4	8000	2400	360	12

40000
+ 8000
+ 12000
+ 2400
+ 1800
+ 360
+ 60
+ 12
64632

The long list of numbers in the addition part can be used to check that all of the answers from the grid have been included, however, when children are working with numbers where they can confidently and correctly calculate the addition (or parts of the addition) mentally, they should be encouraged to do so.
For example,

x	2000	600	90	3	
20	40000	12000	1800	60	= 53 860
4	8000	2400	360	12	= 10 772 +
					64 632

Adding across mentally, leads children to finding the separate answers to:
2 693 x 20
2 693 x 4

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

During Year 5, the transition from the grid method into the formal vertical method for multiplication should take place. The traditional vertical compact method of written multiplication is a highly efficient way to calculate, but it has a very condensed form and needs to be introduced carefully.
It is most effective to begin with the grid method, moving to an expanded vertical layout, before introducing the compact form. This allows children to see, and understand, how the processes relate to each other and where the individual multiplication answers come from e.g.

368 x 6

x	300	60	8
6	1 800	360	48

1800
+ 360
+ 48
2208

Th H T U
3 6 8
x 6
4 8 (8 x 6)
3 6 0 (60 x 6)
+ 1 8 0 0 (300 x 6)
2 2 0 8

Th H T U
3 6 8
x 6
4 8 (8 x 6)
3 6 0 (60 x 6)
+ 1 8 0 0 (300 x 6)
2 2 0 8

becomes

Th H T U
3 6 8
x 6
2 2 0 8

The place value columns are labelled to ensure children understand the size of the partitioned digits in the original number(s) and in the answer.
It is vital that the teacher models the correct language when explaining the process of the compact method. The example shown should be explained as:
"Starting with the least significant digit… 8 multiplied by 6 is 48, put 8 in the units and carry 4 tens (40). 6 tens multiplied by 6 are 36 tens. Add the 4 tens carried over to give 40 tens (which is the same as 4 hundreds and 0 tens). Put 0 in the tens place of the answer and carry 4 hundreds. 3 hundreds multiplied by 6 are 18 hundreds. Add the 4 hundreds carried over to give 22 hundreds (which is the same as 2 thousands and 2 hundreds). Write 2 in the hundreds place of the answer and 2 in the thousands place of the answer."

Children should recognise that the answer is close to an estimated answer of 400 x 6 = 2 400

Long multiplication could also be introduced by comparing the grid method with the compact vertical method. Mentally totalling each row of answers is an important step in children making the link between the grid method and the compact method.

x	600	90	3	
20	12000	1800	60	= 13 860
4	2400	360	12	= 2 772 +
				16 632

Children should only be expected to move towards this next method if they have a secure understanding of place value. It is difficult to explain the compact method without a deep understanding of place value.

Step 1

TTh Th H T U
6 9 3
x 4
2 7 7 2 (693 x 4)

The example shown should be explained as:

"Starting with the least significant digit… 3 multiplied by 4 is 12; put 2 in the units and carry 1 ten (10).

9 tens multiplied by 4 are 36 tens. Add the 1 ten carried over to give 37 tens (which is the same as 3 hundreds and 7 tens). Put 7 in the tens place of the answer and carry 3 hundreds.

6 hundreds multiplied by 4 are 24 hundreds. Add the 3 hundreds carried over to give 27 hundreds (which is the same as 2 thousands and 7 hundreds). Write 7 in the hundreds place of the answer and 2 in the thousands place of the answer. We have now found the answer to 693 x 4. Step 1 is complete so to avoid confusion later, we will cross out the carried digits 3 and 1."

Step 2

TTh Th H T U
6 9 3
x 2 4
2 7 7 2 (693 x 4)
+ 1 3 8 6 0 (693 x 20)

Now we are multiplying 693 by 20. Starting with the least significant digit of the top number… 3 multiplied by 20 is 60. Write this answer in.
90 multiplied by 20 is 1 800. There are no units and no tens in this answer, so write 8 in the hundreds place and carry 1 in the thousands.

Step 3

TTh Th H T U
6 9 3
x 2 4
2 7 7 2 (693 x 4)
+ 1 3 8 6 0 (693 x 20)

600 multiplied by 20 is 12 000. Add the 1 (thousand) that was carried to give 13 000. There are no units, no tens and no hundreds in this answer, so write 3 in the thousands place and 1 in the ten thousands place.

The final step is to total both answers using efficient columnar addition.

When using the compact method for long multiplication, all carried digits should be placed below the line of that answer e.g. 3 x 4 is 12, so the 2 is written in the units column and the 10 is carried as a small 1 in the tens column.
This carrying below the answer is in line with the written addition policy in which carried digits are always written below the answer/line.

YEAR 6

End of Year Objective:

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

By the end of year 6, children should be able to use the grid method and the compact method to multiply any number by a two-digit number. They could also develop the method to be able to multiply decimal numbers with up to two decimal places, but having been introduced to expanded and compact vertical methods in Year 5, it may be appropriate to use the expanded vertical method when introducing multiplication involving decimals.

4.92 x 3

T U . t h			T U . t h
4 . 9 2		becomes	4 . 9 2
x 3			x 3
0 . 0 6	(0.02 x 3)		$1\,4^{2}$. 7 6
2 . 7	(0.9 x 3)		
+ 1 2	(4 x 3)		
1 4 . 7 6			

Children should also be using this method to solve problems and multiply numbers, including those with decimals, in the context of money or measures, e.g. to calculate the cost of 7 items at £8.63 each, or the total length of six pieces of ribbon of 2.28m each.

Appendix E (4)
Calculations Policies
Division

Progression Towards a Written Method for Division

In developing a written method for division, it is important that children understand the concept of division, in that it is:

- repeated subtraction

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of multiplication
- not commutative i.e. 15 ÷3 is not the same as 3 ÷ 15
- not associative i.e. 30 ÷ (5 ÷ 2) is not the same as (30 ÷ 5) ÷ 2

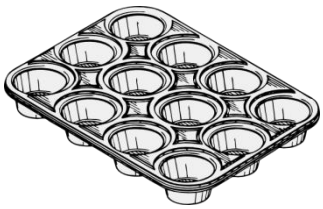
EYFS

Early Learning Goal:

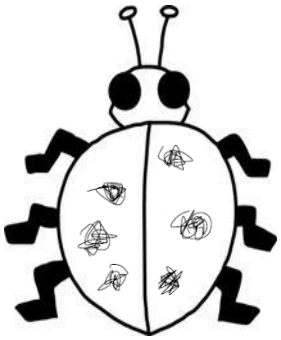
Children solve problems, including halving and sharing.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, including small world play, role play, counters, cubes etc.

Children may also investigate sharing items or putting items into groups using items such as egg boxes, ice cube trays and baking tins which are arrays.



They may develop ways of recording calculations using pictures, etc.



A child's jotting showing halving six spots between two sides of a ladybird.

A child's jotting showing how they shared the apples at snack time between two groups.

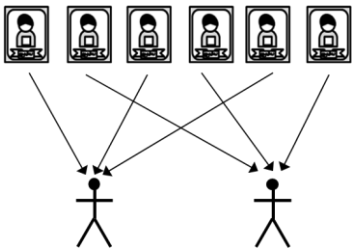
Y1

End of Year Objective:

Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

In year one, children will continue to solve division problems using practical equipment and jottings. They should use the equipment to share objects and separate them into groups, answering questions such as 'If we share these six apples between the three of you, how many will you each have? How do you know?' or 'If six football stickers are shared between two people, how many do they each get?' They may solve both

of these types of question by using a 'one for you, one for me' strategy until all of the objects have been given out.



Children should be introduced to the concept of simple remainders in their calculations at this practical stage, being able to identify that the groups are not equal and should refer to the remainder as '… left over'.

Y2

End of Year Objective:

Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs.

Children will utilise practical equipment to represent division calculations as grouping (repeated subtraction) and use jottings to support their calculation, e.g.

12 ÷ 3 =

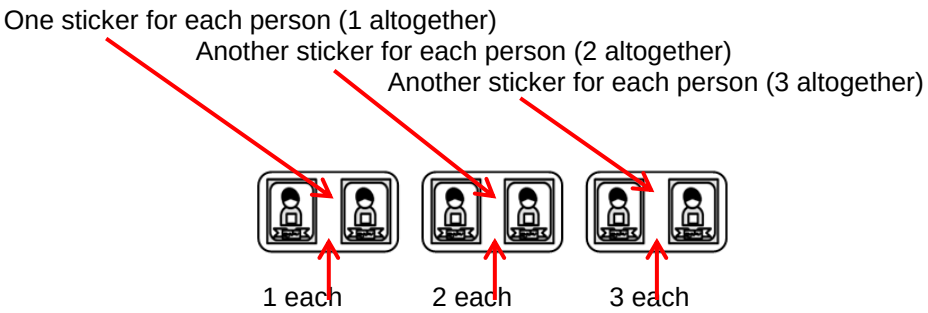
Children need to understand that this calculation reads as 'How many groups of 3 are there in 12?'

The link between sharing and grouping can be modelled in the following way:

To solve the problem 'If six football stickers are shared between two people, how many do they each get?'

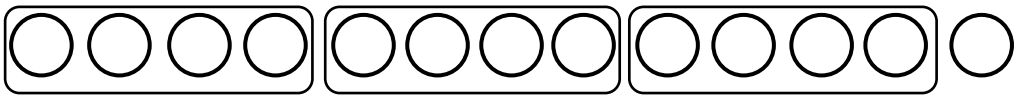
Place the football stickers in a bag or box and ask the children how many stickers would need to be taken out of the box to give each person one sticker each (i.e. 2) and exemplify this by putting the cards in groups of 2 until all cards have been removed from the bag.

Or:



Children should also continue to develop their knowledge of division with remainders, e.g.

13 ÷ 4 =



13 ÷ 4 = 3 remainder 1

Children need to be able to make decisions about what to do with remainders after division and round up or down accordingly. In the calculation 13 ÷ 4, the answer is 3 remainder 1, but whether the answer should be rounded up to 4 or rounded down to 3 depends on the context, as in the examples below:

I have £13. Books are £4 each. How many can I buy?
Answer: 3 (the remaining £1 is not enough to buy another book)

Apples are packed into boxes of 4. There are 13 apples. How many boxes are needed?
Answer: 4 (the remaining 1 apple still need to be placed into a box)

Y3

End of Year Objective:

Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, progressing to formal written methods.*

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study."*

It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

Initially, children will continue to use division by grouping (including those with remainders), where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

43 ÷ 8 =

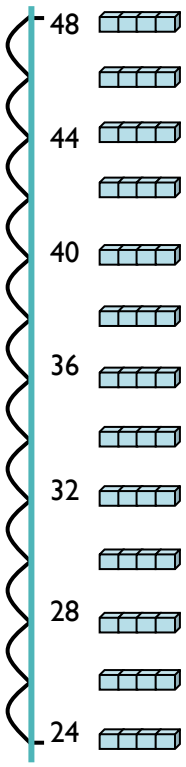
43 ÷ 8 = 5 remainder 3

In preparation for developing the 'chunking' method of division, children should first use the repeated subtraction on a vertical number line alongside the continued use of practical equipment. There are two stages to this:

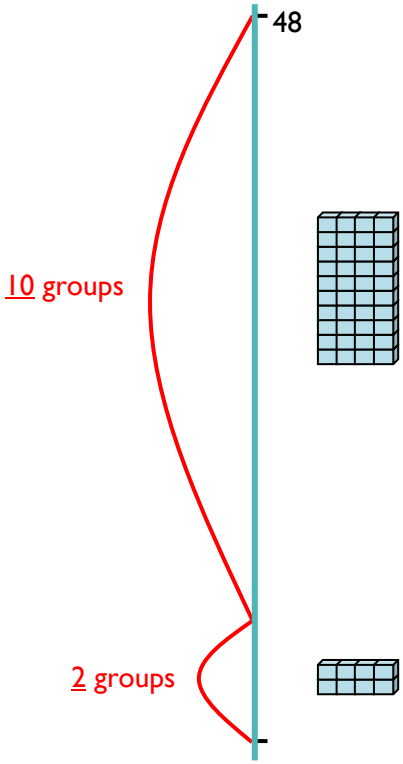
Stage 1 – repeatedly subtracting individual groups of the divisor
Stage 2 – subtracting multiples of the divisor (initially 10 groups and individual groups, then 10 groups and other multiples in line with tables knowledge)
After each group has been subtracted, children should consider how many are left to enable them to identify the amount remaining on the number line.

Stage 1 Stage 2

48 ÷ 4 = 12 (groups of 4)



48 ÷ 4 = 10 (groups of 4) + 2 (groups of 4)
= 12 (groups of 4)



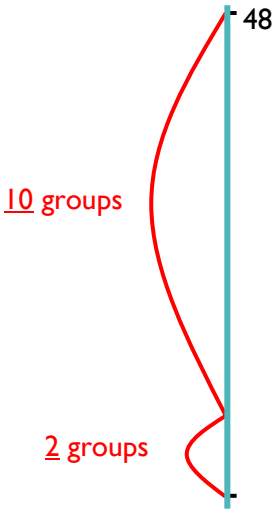
Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

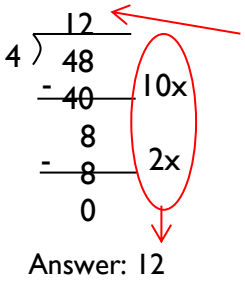
Y4

End of Year Objective:

Divide numbers up to 3 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

Children will continue to develop their use of grouping (repeated subtraction) to be able to subtract multiples of the divisor, moving on to the use of the 'chunking' method.





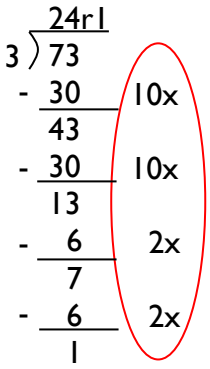
Answer: 12

Children should write their answer above the calculation to make it easy for them and the teacher to distinguish.

The number line method used in year 3 can be linked to the chunking method to enable children to make links in their understanding.

When developing their understanding of 'chunking', children should utilise a 'key facts' box, as shown below. This enables an efficient recall of tables facts and will help them in identifying the largest group they can subtract in one chunk. Any remainders should be shown as integers, e.g.

73 ÷ 3

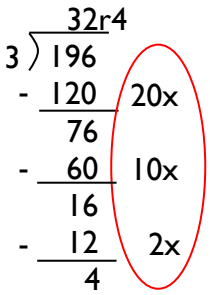


Key facts box

1x	3
2x	6
5x	15
10x	30

By the end of year 4, children should be able to use the chunking method to divide a three digit number by a single digit number. To make this method more efficient, the key facts in the menu box should be extended to include 4x and 20x, e.g.

196 ÷ 6



Key facts box

1x	6
2x	12
4x	24
5x	30
10x	60
20x	120

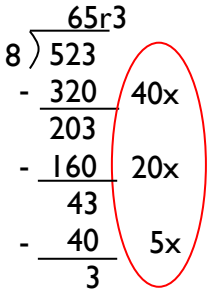
Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

Y5

End of Year Objective:
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.

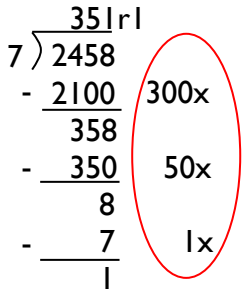
Children may continue to use the key facts box for as long as they find it useful. Using their knowledge of linked tables facts, children should be encouraged to use higher multiples of the divisor. During Year 5, children should be encouraged to be efficient when using the chunking method and not have any subtraction steps that repeat a previous step. For example, when performing 347 ÷ 8 an initial subtraction of 160 (20 x 8) and a further subtraction of 160 (20 x 8) should be changed to a single subtraction of 320 (40 x 8). Also, any remainders should be shown as integers, e.g.

523 ÷ 8



By the end of year 5, children should be able to use the chunking method to divide a four digit number by a single digit number. If children still need to use the key facts box, it can be extended to include 100x.

2458 ÷ 7



Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

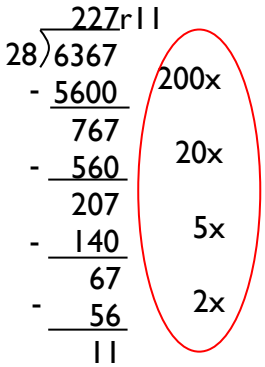
Y6

End of Year Objective:

Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

To develop the chunking method further, it should be extended to include dividing a four-digit number by a two-digit number, e.g.

6367 ÷ 28



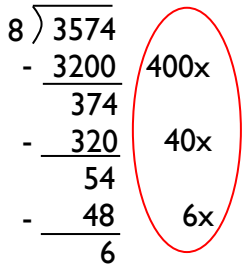
Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

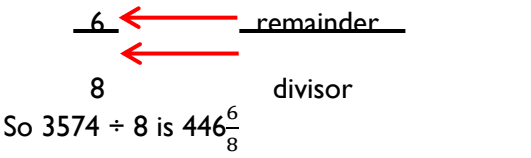
In addition, children should also be able to use the chunking method and solve calculations interpreting the remainder as a decimal up to two decimal places.

This should first be demonstrated using a simple calculation such as 13 ÷ 4 to show the remainder initially as a fraction.

Using practical equipment, children can see that for 13 ÷ 4, the answer is 3 remainder 1, or put another way, there are three whole groups and a remainder of 1. This remainder is one part towards a full group of 4, so is $\frac{1}{4}$. To show the remainder as a fraction, it becomes the numerator where the denominator is the divisor (the number that you are dividing by in the calculation).

3574 ÷ 8





So 3574 ÷ 8 is $446\frac{6}{8}$

(when the remainder is shown as a fraction)

To show the remainder as a decimal relies upon children's knowledge of decimal fraction equivalents. For decimals with no more than 2 decimal places, they should be able to identify:

Half: $\frac{1}{2} = 0.5$

Quarters: $\frac{1}{4} = 0.25$, $\frac{3}{4} = 0.75$

Fifths: $\frac{1}{5} = 0.2$, $\frac{2}{5} = 0.4$, $\frac{3}{5} = 0.6$, $\frac{4}{5} = 0.8$

Tenths: $\frac{1}{10} = 0.1$, $\frac{2}{10} = 0.2$, $\frac{3}{10} = 0.3$, $\frac{4}{10} = 0.4$, $\frac{5}{10} = 0.5$, $\frac{6}{10} = 0.6$, $\frac{7}{10} = 0.7$, $\frac{8}{10} = 0.8$, $\frac{9}{10} = 0.9$

and reduce other equivalent fractions to their lowest terms.

In the example above, 3574 ÷ 8, children should be able to identify that the remainder as a fraction of $\frac{6}{8}$ can be written as $\frac{3}{4}$ in its lowest terms. As $\frac{3}{4}$ is equivalent to 0.75, the answer can therefore be written as 446.75.

Appendix F
Times Tables Policy

Introduction

This policy outlines the aims, organisation and management of the teaching and learning of times tables at Anchorsholme Academy.It has been based on the New National Curriculum (NC) programme of study (PoS) and supplementary materials from the NCETM, Third Space Learning and Times Tables Rock Stars.

This policy will be reviewed in July 2024.

Philosophy

Times tables are a fundamental element of a well-rounded mathematics curriculum. Rapid recall of times tables allow children to access and assimilate new learning more quickly, and should also encourage confidence and independence during problem solving and real-life situations.

As the National Curriculum requires children to know and rapidly recall times table (and associated division) facts up to and including 12 x 12, the following document outlines the ways we aim to ensure that children are able to achieve age related expectation in the end of Year 4 Multiplication Tables Check. Subsequently, children should enter Upper Key Stage Two without poorer times tables knowledge limiting their progress.

Aims

- To systematically develop children's knowledge and fluency of times tables facts.
- To teach the children strategies to help learn and recall their times tables out of order, rather than simply knowing a string of 'meaningless' numbers.
- To ensure the children understand the commutative law of times tables. For example, 4 x 8 is the same as 8 x 4.
- To ensure that children have good knowledge of the division facts related to times tables, and that they therefore understand the inverse relationship of multiplication and division.
- To give meaning to the learning of times tables by allowing the children to understand their wider application.
- For children to be more confident mathematicians as the result of strong times tables knowledge supporting new learning.

Teaching of Times Tables

Organisation

- The whole class teaching of times tables should be completed daily using the times tables booklets provided by the NCETM. Teaching must use the guidelines set out below for all classes from Year 2 upwards.
    - Whole class focus times table is recorded on the working wall, with new facts indicated.
        - The focus times table should always be the second multiplicand in the calculation.

- Children complete a two minute times tables test (using the display as support)
- This is marked as a class
  - Children will be encouraged to use the same verbal pattern when answering each question e.g. 'Seven sixes are forty two.'
  - This is also applied for division calculations e.g. 18 / 3 = 6 would be marked stating 'Three sixes are eighteen.'
- Children should be aiming to better their own score each test.

- Children should have regular weekly access to independent times tables practice in school. This can be completed through:
  - TTRS (2-3 x pw using class computer/iPad):
    - Garage set from teacher assessment to teach knowledge gaps.
    - Studio to review and recap all times tables up to 12 x 12
    - Soundcheck for Year 3 & 4 children to practice the MTC.
  - There are also various activities on Top Marks: https://www.topmarks.co.uk/maths-games/7-11-years/times-tables
  - Times tables songs can be used on Youtube
  - For UKS2, speed tables grids may be used to practice times tables for fluent children.
    - Those who still need support should receive intervention.
    -
- Interventions and precision teaching should be established for those children who need extra support.

Assessment, Reporting and Recording

Weekly Assessment

Providing the minimum requirements are being met, weekly assessment should be easy to collate:

- Times tables booklets/tests should be marked and scores collated each week to view pupil progress.
  - This could be in booklets, maths books or designated times tables books.
- For UKS2, speed tables grids can be filed or glued into maths books.
- TTRS assessment data will automatically be logged for each session.

Periodic Scheduled Assessments

The times tables tracker should be completed at the end of each half term using data from TTRS and weekly times tables assessments:

- Every half term, children should be encouraged to play 10 games on garage (minimum) on TTRS, focusing only on the times tables for their Year Group.
- Children in Year 4 will also be assessed every two weeks (minimum) using Soundcheck on TTRS. This will allow tracking specifically related to the MTC.

Data will be regularly monitored by CH and JE (and the wider maths team) to ensure that teaching requirements are being met and that children across school are making appropriate progress. This will be completed through monitoring the times tables tracker, TTRS access and data, drop-ins and times tables quizzes.

Intervention

At Anchorsholme Academy, the teachers react swiftly to any signs of children falling behind or data indicating underachievement at any level. As part of times tables activities, a teacher or TA may work with a focus group for a short time on a specific, identified area of misconception.

Any children receiving times tables intervention (E.g. precision teaching) should be recorded weekly by the teacher or TA responsible for the intervention.

Curriculum Map

The following curriculum maps has been designed using the New National Curriculum (NC), programme of study (PoS) and supplementary materials from the NCETM and Third Space Learning. These guidelines are recommended for whole class activities.

During independent tasks, children can be set times tables activities beyond (or behind) these outlines to allow for progress at the right rate for each child. However, during whole class activities, all children should focus on the same areas to ensure regular practice is being given to all times tables.

Year 1

Whilst Year 1 will not formally teach times tables or use the times tables booklets, in order to help pupils develop fluency and confidence as early as possible, we would like the following structure to be used within the year group.

Autumn 1 & 2	Count in 2's up to 24, linking with even numbers and supporting doubles. Count in multiples of 10 in order up to 120.
Spring 1 & 2	Focus on counting in multiples of 5 up to 60, linking with knowledge of counting in 10s. Continue to develop fluency of counting in 2's and 10's.
Summer 1	Count in multiples of 10, 2 and 5 in order with growing fluency.
Summer 2	Count in multiples of 10, 2 and 5 in order fluently.

(Third Space Learning, n.d., p. 3)

Year 2

Building on the concepts of counting in number patterns established in Year 1, formal teaching of times tables should begin in Year 2. The process for teaching and learning is outlined in the previous section of this policy.

In Year 2, pupils should be taught the following times tables:

Autumn	Recalling multiples of the 10 times table, up to 12 x 10, including related division facts. Recalling multiples of the 5 times table, up to 12 x 5, including related division facts.
Spring	Recalling multiples of the 2 times table, up to 12 x 2, including related division facts. Recalling multiples of the 3 times table, up to 12 x 3, including related division facts.
Summer	Revision of multiplication and division facts for the 10, 5, 2 and 3 times tables.

Where pupils are identified as struggling with fluency in a particular times tables set, intervention should be delivered in timely manner.

Year 3

Building on the times tables teaching from Year 2, in Year 3, pupils should be taught the following times tables:

Autumn	Recalling multiples of the 4 times table, up to 12 x 4, including related division facts. Recalling multiples of the 8 times table, up to 12 x 8, including related division facts.
Spring	Recalling multiples of the 6 times table, up to 12 x 6, including related division facts. Recalling multiples of the 9 times table, up to 12 x 9, including related division facts.
Summer	Revision of multiplication and division facts for the 10, 5, 2, 3, 6, 9, 4 & 8 times tables.

Where pupils are identified as struggling with fluency in a particular times tables set, intervention should be delivered in timely manner.

Year 4

Building on the times tables teaching from Years 2 and 3, pupils should be taught the following times tables:

Autumn	Recalling multiples of the 7 times table, up to 12 x 7, including related division facts. Recalling multiples of the 11 times table, up to 12 x 11, including related division facts.
Spring	Recalling multiples of the 12 times table, up to 12 x 12, including related division facts. Revision of multiplication and division facts for all times tables up to and including 12 x 12.
Summer	Revision of multiplication and division facts for all times tables up to and including 12 x 12.

Where pupils are identified as struggling with fluency in a particular times tables set, intervention should be delivered in timely manner.

Pupils in Year 4 should also be given targeted time across the year to develop proficiency and confidence using software similar to that required for the MTC in summer.

Years 5 & 6

The National Curriculum expectation is that by the end of Year 4, children are able to recall all 12 tables up to 12x12.
To secure this, we recommended that the first term of Year 5 be used to consolidate by continuing your practice.
If you find that your children are working below the structure outlined in this document, we recommend tracking back to where your children are.

Autumn Term	**Recall multiples of 12 in any order, including missing numbers and related division facts fluently.** **Recall multiples of all times tables up to 12x12 in any order, including missing numbers and related division facts with growing fluency.**

(Third Space Learning, n.d., p. 7)

Appendix H

Number Bond Policy

Introduction

This policy outlines the aims, organisation and management of the teaching and learning of number bonds at Anchorsholme Academy.

It has been based on the New National Curriculum (NC) programme of study (PoS) and supplementary materials from the NCETM.

This policy will be reviewed in July 2024.

Philosophy

Knowledge of number bonds is a fundamental element of a well-rounded mathematics curriculum. Fluent and effective recall of these facts allows children to access and assimilate new learning more quickly, and should also encourage confidence and independence during problem solving and real-life situations. This is particularly important when building a good mathematical foundation in Key Stage 1.

The following document outlines the ways we aim to ensure that children are able to develop fluency with their number bonds and subsequently be able to access the wider mathematical curriculum with confidence.

Aims

- To systematically develop children's knowledge and fluency of number bond facts.
- To strategically teach the children number bonds in key phases, so associated facts can be linked together.

Curriculum Map

The following curriculum maps to be used are those recommended by the NCETM. These guidelines are recommended for individual pupil learning and progress. The key steps below detail how practice and delivery of the Progression in Number Bonds Curriculum should be managed.

Teaching Process

- Programme begins in EYFS in Spring Term 2.
- Children will be given a set of number facts to learn over the course of approximately six weeks.
- They should practise these at home wherever possible and it will form part of their daily maths lessons.
- The aim is to be able to recall each fact in the set within 3 seconds.
- If children successfully recall all the facts successfully at the end of the six weeks, they will receive a certificate and the next set of facts to learn.
- Children will not be given a new set of facts if they still require practise on the current phase, instead they will practise that particular phase until the next assessment point.
- Children should aim to have all of the facts completed by the end of Year 2. However, it may be that they are completed further up the school so each child is secure and fluent with basic addition by the time they leave our school.

Breakdown of Number Bond Phases

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Adding 1

Doubles

Adding 2

Bonds to 10

Adding 10

Adding 0

Near doubles

Bridging/ compensating

Teaching Tool

K:\Maths\Times Tables 2023\Progression in Number Bonds KS1.docx