East Bierley CE (VC) Primary School

Calculation Strategy

2017

Calculation Strategy

At East Bierley CE (VC) Primary School, our main aim is to provide a high quality education for all of our pupils, balanced with a friendly atmosphere and a Christian perspective within a village community school.

Mission Statement

Within the community, our church school is a special place filled with inclusive learning, laughter and friendship, fostering care and respect where all feel safe and valued.

Our vision is to hold true these beliefs, enabling our children to achieve their fullest potential.

Friendship, Trust, Courage, Respect, Forgiveness

Our aim is to making learning irresistible. We want the children of East Bierley to be respectful and honest with a sound knowledge of right and wrong and the role they have in our school, local and wider community, both now and in the future. We aim to nurture tolerance of others, self reflection and independent learning skills, children who have the resilience to solve problems and persevere with new skills using a 'have a go' attitude towards their learning. We aim to ensure our curriculum is meaningful and enables children to develop the skills they need for the future. The curriculum content is progressive and increasingly adapts to reflect what is relevant now, special anniversaries, the local area and children's interests whilst ensuring coverage of the statutory curriculum is thorough.

Maths at East Bierley is taught through a practical approach using concrete apparatus, games and investigative problem solving. Children are encouraged to access the resources they require and to develop the resilience required to solve problems and search all possible answers. The national curriculum for maths is followed throughout school with lessons targeted for individuals and groups as appropriate to meet their needs and narrow the gap to age related expectations.

Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

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Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

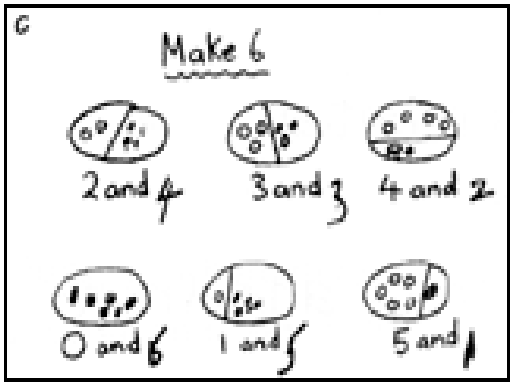
The Calculation approaches may be adapted without the policy being returned immediately to Governors if current research and training indicate an immediate change is required. Any adaptations would then be shared with Governors as soon as appropriate.
Throughout all calculations the importance of place value must not be underestimated. If there are gaps in place value understanding, further learning is being built on shaky foundations and should be addressed immediately.

Calculation Strategy
Addition

EYFS
Children will engage in a wide variety of songs and rhymes, games and activities.
They will begin to relate addition to combining two groups of objects, first by counting all and then by counting on from the largest number.
They will find one more and one less than a given number.
In practical activities and through discussion they will begin to use the vocabulary involved in addition.

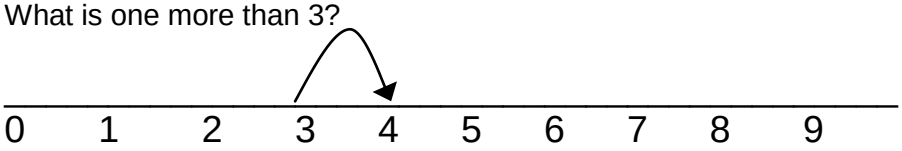
'You have 5 apples and I have 3 apples. How many apples altogether?'

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.



Children will be introduced to Numicon to gain a concrete understanding of number. They will begin to use numberlines to find one more than a given number.

What is one more than 3?



Stage 1

<u>+ = signs and missing numbers</u>

Children need to understand the concept of equality using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.
2 = 1+ 1
2 + 3 = 4 + 1
Missing numbers need to be placed in all possible places.
3 + 4 = □ □ = 3 + 4
3 + □ = 7 7 = □ + 4

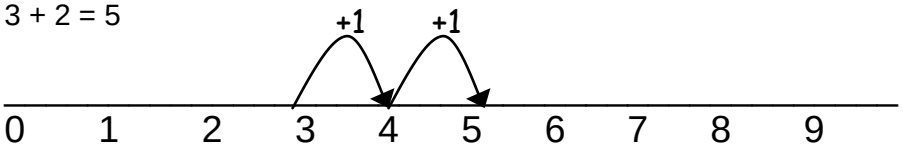
During this stage, children will be gaining confidence in number and will explore using a range of concrete resources. Children will use Unifix, Numicon, Base 10, arrow cards and objects for counting,

Calculation Strategy
partitioning and adding numbers. Children should be confident using these resources before moving onto other methods.

They will practise counting on from any number 'Put five in your head and count on 4'.

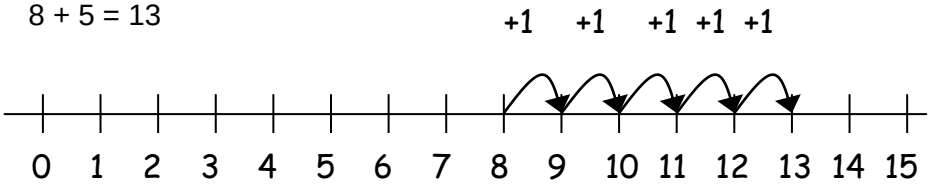
They will begin to use a range of numberlines (numbered, pictured, Numicon, empty) and practical resources to support calculation and teachers *demonstrate* the use of the numberline.

3 + 2 = 5

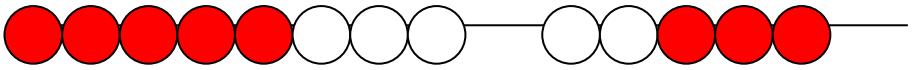


Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.

8 + 5 = 13



Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.



Continue to practise counting on from the largest number for addition with totals within 20.

Children should be given opportunity to practise number bonds to 10 every day and should be encouraged to work out mental calculations of number bonds and doubles.

Stage 2

A number of strategies should be taught always starting with concrete apparatus leading to pictorial representation. When using practical resources such as numicon or base ten it should be laid out vertically in preparation for key stage two methods. The number line is within the national curriculum expectations for year 2 so must be covered but **should not** be the only taught method for addition.

Partitioning numbers during this stage is essential; children should be using Numicon, place value counters, base ten and arrow cards. Children must be confident partitioning before they can move on to the next method.

Children should be taught to use one hundred squares to add multiples of tens and ones.

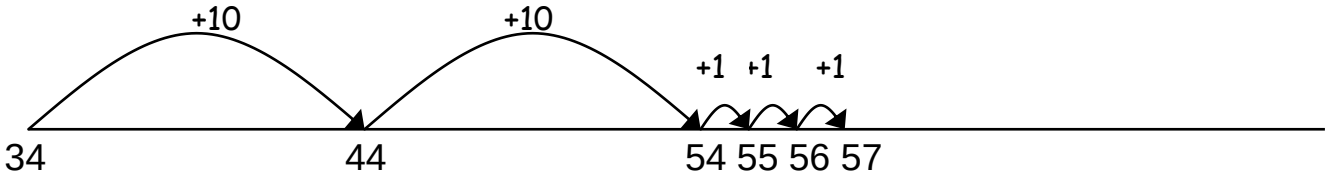
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Children will use 'empty number lines' themselves starting with the larger number and counting on.

- ✓ First counting on in tens and ones. This directly contrasts how we add in column method where we start with the smallest unit so requires place value understanding.

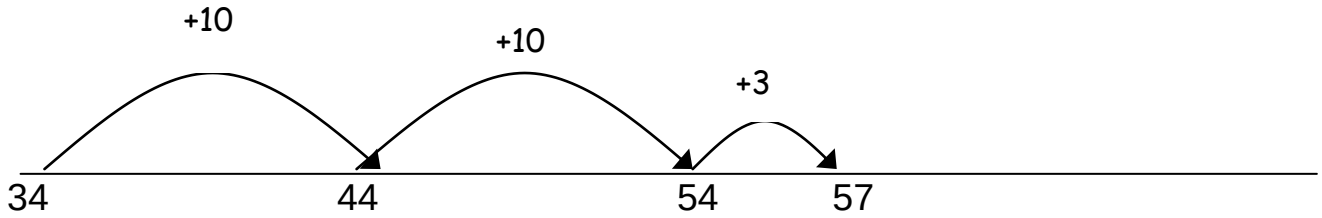
Calculation Strategy

34 + 23 = 57



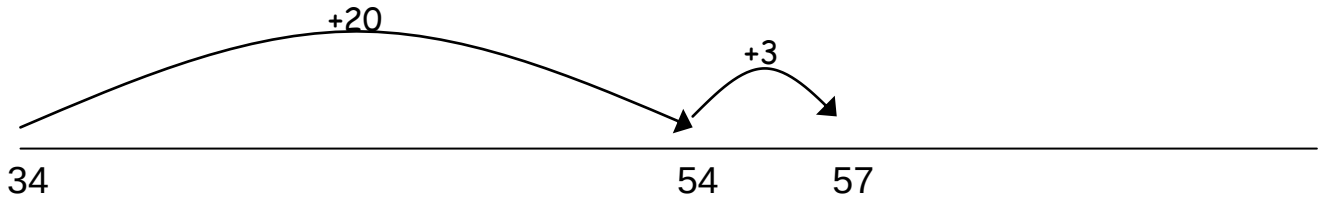
✓ Then helping children to become more efficient by adding the ones in one jump (by using the known fact 4 + 3 = 7).

✓ 34 + 23 = 57



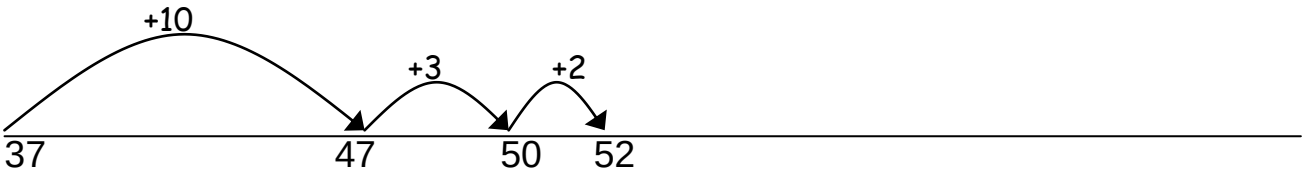
✓ Followed by adding the tens in one jump and the ones in one jump.

34 + 23 = 57



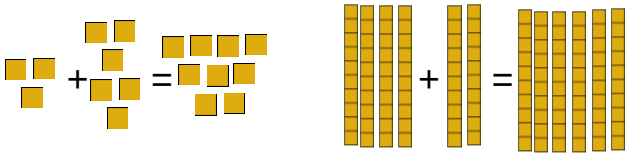
✓ Bridging through ten can help children become more efficient.

37 + 15 = 52



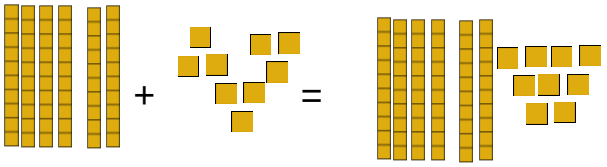
Children should be taught to add using partitioning. This must be done with concrete resources to establish understanding and the ones should always be added first. This will enable children to transition to the vertical written method with less misunderstandings.

43 + 26 =
3 + 6 = 9
40 +20 = 60



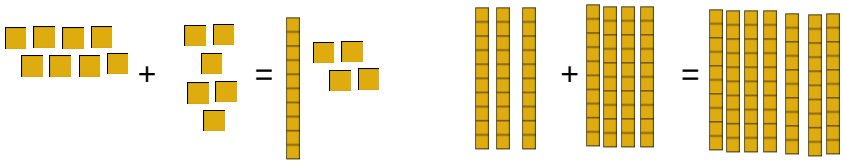
Calculation Strategy

60 + 9= 69

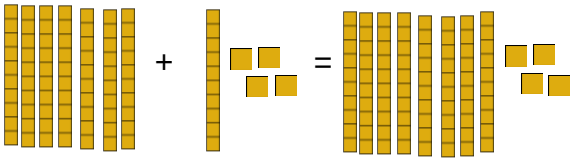


Then move on to calculations that bridge tens (at this point, a discussion will need to be had about regrouping your ones for a ten):

48 + 36 =
8 + 6 = 14
40 + 30 = 70



70 + 14 = 84



The written method below should be used to support children from moving from a practical, pictoral method of addition to a written method. When teaching children how to transition from practical to written it is essential that it is taught step by step. Every time you do something practically, record it before moving onto the next step.

	TO	
	43	
+	26	
	9	(3 + 6)
	60	(40 + 20)
	69	

	TO	
	48	
+	36	
	14	(6 + 8)
	70	(40 + 30)
	84	

Stage 3

Children in this stage will still use concrete apparatus to support their calculations. Base 10 should be the resource that is used primarily before moving onto place value counters. The method above should still be used moving children to three and four digit addition when they have a sound understanding of place value. Always use column headers and one digit per square. Use place value language throughout the process so that you begin with the units and when adding the tens would say that you are adding 60 and 20 so answers are recorded in the tens column. This method will be used for all addition including money, weights and measures, all the time reinforcing place value. Where children require practical resources these can be used alongside this method and column headers should be used.

	TO	
	67	
+	24	
	1 1	(7 + 4)
	80	(60 + 20)
	91	

	HTO	
	267	
+	85	
	12	(7 + 5)
	140	(60 + 80)
	200	
	352	

Calculation Strategy

When children are confident using the expanded method they can move onto the short method. For the introduction of the short method, concrete apparatus must be used. Children should begin with base 10 to understand the concept of regrouping but can then move onto place value counters. It is fine for children to choose not to use these once they have a sound understanding of the method.

```
  TU
  63
+ 32
  95
```

Use the language of place value to ensure understanding: 'Three add two equals five. Write five the ones column. 60 add 30 equals 90 write 9 (90) in the tens column. Children can add larger numbers using the column method that do not require a 'regroup' over.

Recap how to 'regroup' ten from the units to the tens column with two digit numbers. Children will already have done this in the practical methods in previous stages so should know that ten ones is the same as one ten. Explain that because 8 + 4 = 12 we can't put both digits in the ones column so we regroup ten of our units and replace it with one ten. This belongs in the ten column so that is where we put it. All this should be done practically alongside the written.

```
  TU
  68
 +24
  92
   1
```

use the language of place value to ensure understanding: 'eight add four equals 12. write two in the units column and regroup 1 (10) across into the tens column. 60 add 20 add 10 equals 90. Write 9 (90) in the tens column. 92 is the answer.

```
 HTU
 789
+642
1431
  11
```

Extend through 3 digit numbers to four digit numbers and numbers with decimals (in the context of money and measure). All the time reinforce place value language.

Stage 4

Continue with the formal written column method including for addition of decimal numbers. Ensure the language of place value is still modelled at all times. Concrete apparatus should still be used at this stage if the child requires it.

```
 TU.t
  12.3
+23.5
  35.8
```

use language of place value zero point 3 plus zero point 5 is 0.8 so we put the 8 in the tenths column. Then 2 plus 3 equal 5 so the 5 is put in the units column. 10 plus 20 are 30 and that is recorded in the tens column.

Where bridging occurs it may be necessary to return to partitioning the number briefly but still ensure the place value language is used. (Zero point 8 plus zero point 4 is 1.2 so we write the zero point 2 in the tenths column and we regroup the 1 to the units column.

Ensure children have the opportunity to find errors in examples to consolidate understanding. GfGing teachers work and later their own provides the key to checking steps carefully. Examples where the ten was carried but not added in etc.

Calculation Strategy

Our aim is that by the end of Year 6, children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence.

Using this method, children will:

- *add several numbers with different numbers of digits;*
- *begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds;*
- *know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p*.

Children should not be made to go onto the next stage if:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to approximate their answers before calculating. They can record this with an E= in their books alongside the calculation. This ensures they check their answer makes sense.

Children should be encouraged to check their answers after calculation using an appropriate strategy.

If not explicitly required to show working, children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Calculation Strategy
Subtraction

EYFS

Children will engage in a variety of counting songs, rhymes and practical activities. In practical activities and through discussion they will begin to use the vocabulary associated with subtraction.

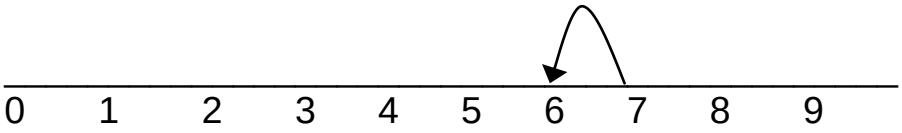
They will find one less than a given number.
They will begin to relate subtraction to taking away using objects to count 'how many are left' after some have been taken away.

6-2=4 

'Take two apples away. How many are left?'

Children will use a numberline to find one less than a given number. Children will begin to find the difference between two amounts counting on from the smaller number using objects. They can also use the numberline to find the difference.

What is one less than 7? Find the difference between 3 and 8.

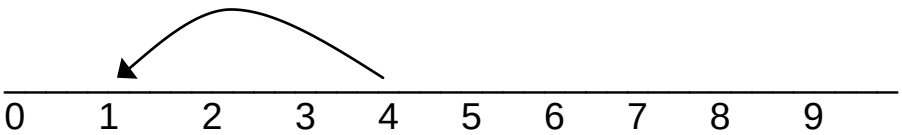


Stage 1

Children in year 1 will begin to explore subtraction using practical activities and concrete resources. Using objects, numicon, base 10 and unifix to count to a total before taking away an amount of objects to see how many are left. Problems should be phrased differently for children including verbally wording problems to create 'real-life' scenarios. It is not essential for children to answer word problems at this stage however, creating a story scenario for them will maximise their understanding.

Four teddies are at the picnic blanket. Three teddies go and play on the swings. How many teddies are left on the picnic blanket?

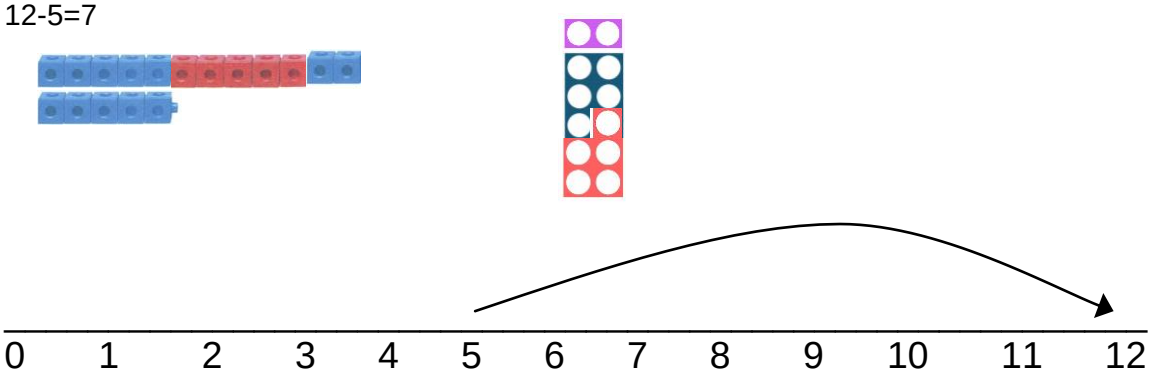
4 -3 = 1
4 take away 3 = 1



Calculation Strategy

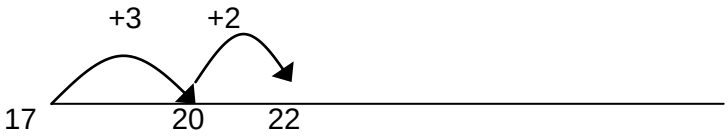
Count on to find the difference. When introducing this terminology it is important that children understand they are not looking for differences between the numbers (eg. 12 has two digits whilst 5 has one digit) but a difference in an amount. Use of unifix, numicon, pictoral models numberlines and will support this well.

12-5=7



We always begin with the smaller number and count on to the bigger number. Start with the smallest number on the numberline and count on in steps to the larger number. Then add the total of the jumps to find the difference. Jumps of one are to be used within questions to 20 but when working on larger numbers aim to incorporate larger jumps.

22-17 = 5

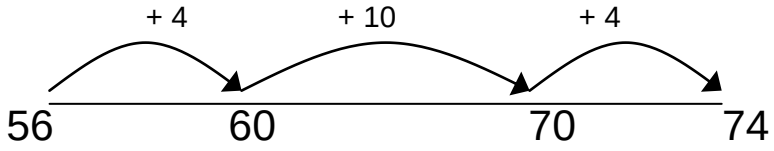


3+2 = 5

Stage 2

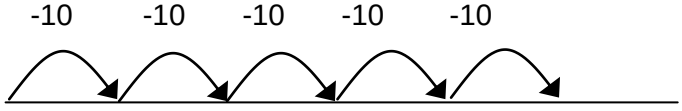
Children need to work on subtracting tens quickly and number bond work, children in this stage need to be exposed to lots of practical subtraction. Using a hundred square will help them subtract tens quickly, these should be available in classrooms and children should be able to use these with confidence. They should continue to use numicon and numberlines to take away and find the difference.

Finding the difference:
74 – 56 = 18



10 + 4 + 4 =18

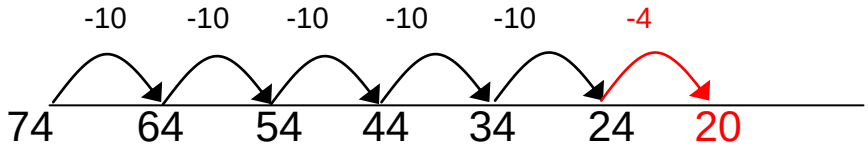
Taking away:
74 – 56 =
Step 1: Draw the numberline, starting with the largest number at the left. Take away the tens.



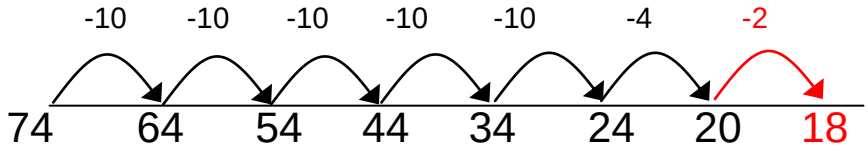
Calculation Strategy

74 64 54 44 34 24

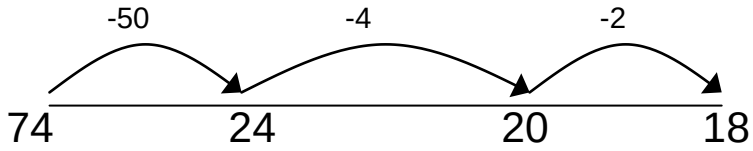
Step 2: If bridging occurs, take away what is needed to get to the multiple of ten. If not, take the ones.



Step 3: Knowledge of basic bonds are important for this step. If bridging has occurred, take the remaining numbers left to make the total ones.

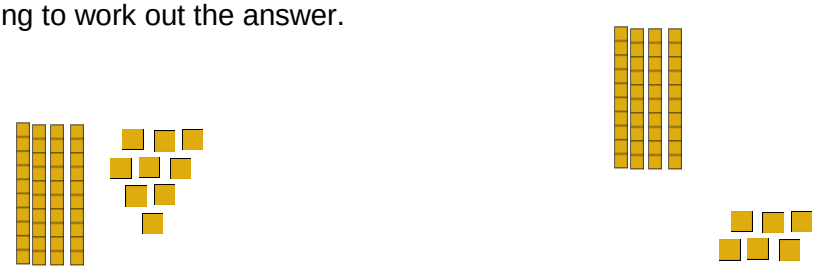


When children are confident with subtracting tens, they can subtract the full multiple of ten without breaking it down.



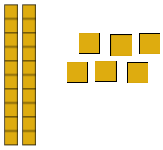
Children should be taught to use base 10, laying the equipment out using the decomposition method. Children are not required to record this using written methods but should be encouraged to talk about what they are doing to work out the answer.

49 – 23 =

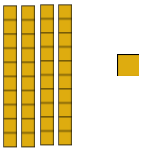


Step 1: Make the larger number. Always start by subtracting the ones.
'You have 9 ones, you need to subtract 3, how many ones do you have left?'
When the three ones have been subtracted, move the remaining ones so they are below the tens.

Step 2: Then move to the tens. 'You have four tens, you need to subtract two tens. How many tens do you have left?' Move the remaining tens next to the ones. You have 26 left.

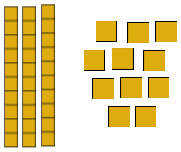


To move children on to the next stage, the questions will require bridging.
41 – 18 =

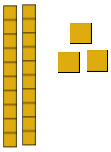


Calculation Strategy

Step 1: Make the larger number. Always start by subtracting the ones.
'You have 1 ones, you need to subtract 8, is this possible?'
"When we had too many units we had to regroup, now we don't have enough units so we need to do the inverse/opposite, we need to decompose a ten"
Model taking a ten from the tens and decomposing it for ten ones.



Step 2: 'You now have eleven ones. Can we subtract 8?' Children to take 8 ones away and move the remaining ones under the tens.
Step 3: How many tens do we need to take? Children should take the tens column next.



When using this method, children should record the question and answer using a number sentence. Photos should be put in books to show the use of concrete resources being used to support subtraction.

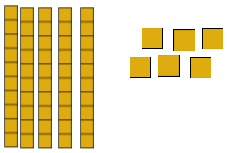
Stage 3

Children in this stage should be confident using a hundred square to subtract multiples of 10, they should have a firm grasp on number bonds to and within 20 and should be confident at partitioning two digit numbers. During this stage, children will be encouraged to decide whether they need to subtract using decomposition method or whether finding the difference by counting up would be a quicker, easier option. Children should be taught how to decide which method is most efficient and should be given opportunities to practise both mental and written calculations involving these methods.

When recording the decomposition method, column headers should always be used. At this stage, concrete resources are essential to demonstrate an understanding.

56 – 34 =

Step 1: Children should begin by partitioning both number and making the largest number using base 10.



They should record the largest number in their books because this is the number they have made:

		T		O
	5	0	and	6
-				4
				2

Step 2: They should then subtract the ones. They have 4 to subtract so this should be written down. They should then subtract the four ones physically using the base 10 and move the ones below the tens and write the answer in the correct column.

		T		O
-	5	0	and	6

		T		O
	5	0	and	6
-	3	0	and	4

Calculation Strategy

	2	0	and	2

Step 3: Children should write down that they are subtracting 30 from 50 and subtract 3 tens physically using the base 10. They should then move these down to sit next to the ones. When children have moved the base 10 'down' they know they have gotten to the answer in that column. Children should then join the two partitioned numbers back together to make their answer.

This method can also be used with three and four digit numbers if it is the method best understood by the child.

When children are ready to decompose, they should again do this using practical resources. The same method should be used; the child should record every physical move that is made to ensure they do not miss a step.

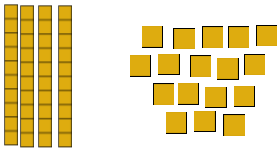
57 – 29 =

		T		O
	5	0	and	7
-				

Step 1: Make the larger number using base 10 and record. The base 10 and written method must run alongside each other to develop and deepen the child's understanding. You are looking to hear children talking about what they are doing. They need to be fully confident with every step of the method to avoid confusion in later stages.

Step 2: Children should look at the ones that they need to take away. You may hear children say at this point 'I can't take away 9 so I will swap and put the 9 at the top and then take 7 away' – reiterate learnt knowledge from earlier stages. Is 9 – 7 and 7 – 9 the same thing? Discuss commutativity. **Do not let this go unaddressed.** Children must understand and be able to explain why this is something that you cannot do.

Children should realise that they cannot take 9 away from 7 so therefore they need to decompose. Often, to make children aware of the step they are taking I ask children to hold the base 10 piece up and declare to everyone around them ' I AM DECOMPOSING MY TEN/HUNDREDetc) when they have replaced the ten for ten ones, they must write it down. They can then physically take the 9 ones from the 17 ones and record their answer in the ones column.



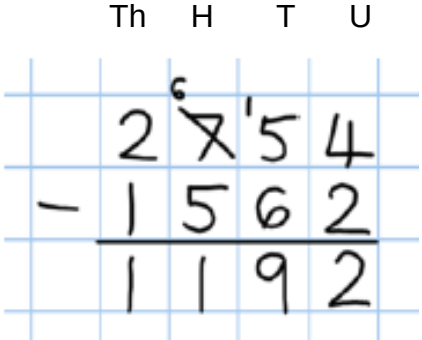
		T		O
	4~~5~~	0	and	17
-				9
				8

Step 3: Children can then move onto their tens column. They are subtracting 20 so should write this down. They can then physically take 2 tens away and write the answer in the tens column. Children should then join the two partitioned numbers back together to make their answer.

		T		O
	4~~5~~	0	and	17
-	2	0	and	9
	2	0	and	8

Once children are secure with the understanding of 'decomposing', they can use this method for numbers with a larger amount of digits.

To introduce the compact decomposition method, ask children to perform a subtraction calculation with the familiar partitioned column subtraction then display the compact version for the calculation they have done. Ask children to consider how it relates to the method they know, what is similar and what is different, to develop an understanding of it. It is a good idea to return to subtraction of 2 and 3 digit numbers here to introduce the concept of short subtraction. Use practical resources – base ten or place

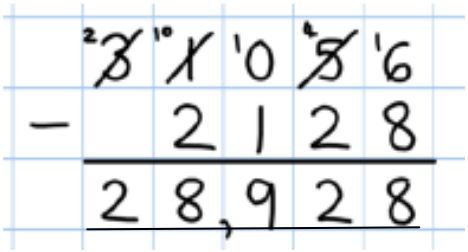


Calculation Strategy
value counters. Ensure that each step is followed as before until children are confident in the method. Column headers should be used.

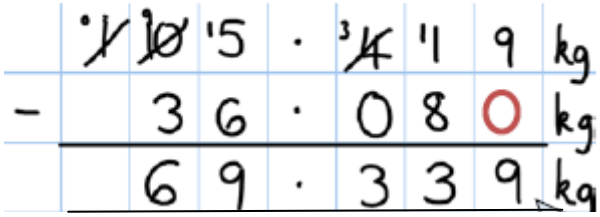
Children who are not secure with number facts will need to remain on the partitioned method. Children who enter school need to be encouraged to use practical resources to subtract using school methods.

Stage 4

Subtraction using larger numbers and decimals. Ensure the decimal point remains lined up (it does not need a square just the lines between them squares) and support using column headers.



Zero can fill empty decimal places to show the place value **but don't leave a square for the decimal as below, put it on the line in the corner between squares.**



There should be regular opportunities for children to check calculations using the inverse. Subtraction can be the lead calculation so children check the answer using the addition.

Children should not be made to go onto the next stage if:

1) **they are not ready.**
2) **they are not confident.**

Children should be encouraged to approximate their answers before calculating. They can record this with an E= in their books alongside the calculation. This ensures they check their answer makes sense.

Children should be encouraged to check their answers after calculation using an appropriate strategy.

If not explicitly required to show working, children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Calculation Strategy
Multiplication

EYFS

Children will engage in a wide variety of songs, rhymes, games and activities. In practical activities and through discussion they will being to solve problems including counting in groups of 2, 5 and 10 and doubling.

'Three apples for you and three apples for me. How many apples altogether?'

Stage 1

Early multiplication begins with counting in different steps. Learning tables should begin in Year 1 with the 2, 5, and 10 times tables. Times table songs and games are encouraged during this stage.

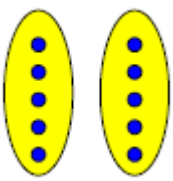
Children will count repeated groups of the same size in practical contexts. They will solve practical problems that involve combining groups of 2,5 or 10. eg socks, fingers, cubes.

'Six pairs of socks. How many socks altogether? 2,4,6,8,10,12'

'Three pots of ten crayons. How many crayons altogether? 10, 20, 30'

Children will use arrays to support early multiplication.

'Five groups of two faces. How many faces altogether? 2,4,6,8,10'
'Two groups of five faces. How many faces altogether? 5,10'



Children should also be taught to use groups of objects to work out multiplication. This can be done using counters and counting groups such as two groups of 5. Numicon should also be used to show groups.

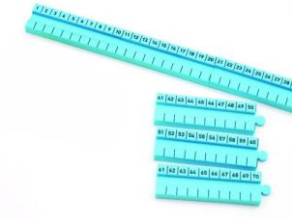
Continue to solve problems in practical contexts and develop the language of early multiplication, with appropriate resources.

Calculation Strategy
Children should also be introduced to Cuisenaire rods during this stage. All work done with the rods should be practical and pictorial.

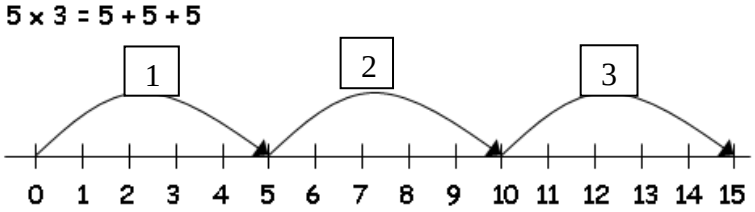
Stage 2
During this stage children should continue to practise their x2, x5, x10 tables and should be introduced to their x4 tables. Links should be made from the two times tables through doubling. It is important during this stage for children to use concrete resources to demonstrate an understanding of practical multiplication. They need to develop mathematical language through talk which is has been scaffold by adults.

Cuisenaire Rods
Cuisenaire rods are a fantastic resource for teaching multiplication and division. The first step is for children to become familiar with them. They need to know which rod represents which number 1-10. A number track will be needed when using these resources.

Repeated addition

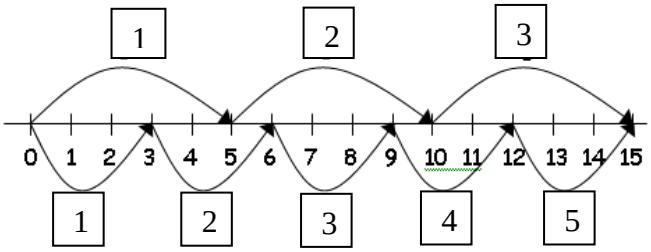


Repeated addition can be shown easily using the Cuisenaire rods:
Firstly, discuss that we want 5 times 3 so we want the 5 rods.
How many five rods do we need?
Place the three rods on the number track.
Discuss how 5 + 5 + 5 = 15, 5 x 3 = 15 and 3 lots of 5 = 15



Commutativity

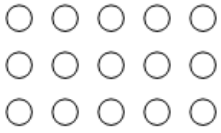
Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.



Both of these methods should be taught together, children should do these practically to begin with using the Cuisenaire rods and then move onto recording using written methods.
Again, when moving from practical to written it is important that you write after each step.
Step 1: Read the question and decide which Cuisenaire rods you will need to use. Draw an empty number line starting at 0.
Step 2: Place the first Cuisenaire rod on the track. Write the first jump, label the jump 1 and write the number it lands on, on the numberline.
Step 3: Continue placing the rods down one at a time and recording the jumps on the numberline. When all of the rods needed are placed on the track, find the answer by looking for the end number on the numberline.

Arrays

Children should be able to model a multiplication calculation using an array. **This knowledge will support with the development of the grid method.**

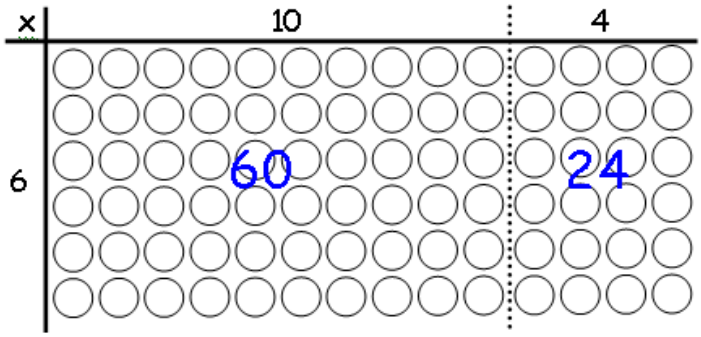


5 x 3 = 15

3 x 5 = 15

3 rows of 5 / 3 groups of 5 / 5 groups of 3 / 3x5=15 5x3=15

Children will use partitioning when multiplying larger numbers. Where necessary they should be encouraged to still picture the groups in arrays if it helps their understanding.



(6 x 10) + (6 x 4)

60 + 24

84

Stage 3

Children will be taught that when multiplying by 10 and 100 the digits move one/two column(s) to the left and a place holder is put in place (if required). Column headers and children's understanding of them are very important. Introducing the concept to a whole class it should be about moving colum. Demonstrating with 1.5 to become 15 proves we are not adding a zero but requires a deeper understanding of the concept. **Do not tell children to add a zero. This only makes learning harder in later stages as trying to address misconceptions that are deeply embedded proves very tricky.**

Children should continue to use grid method during this stage. Children can use place value counters if needed. Place value grids can also be used to remind children how to multiply numbers by 10 and 100. We can explain that children can multiply 4 x 3 but they must then multiply their answer by 10 to find 30 x 4 as 30 is ten times bigger than 3.

36 x 4 = 144

X	30	6
4	120	24

Children can use grid method to multiply two and three digit numbers by one digit. Once children are confident in using the grid method for one digit multiplication they should move on to the formal expanded written method:

36 x 4 = 144

```
  36
 x  4
 24   (4 x 6)
120   (4 x 30)
144
```

Calculation Strategy

When moving onto 2 digit by 2 digit multiplication, it would be useful to revert to grid method to ensure the children understand how the partitioning element supports the long multiplication method. When children are confident in the grid method, they can move onto the expanded method.

X	20	3
10	200	30
3	60	9

23 x 13 = 299

```
  23
X 13
  9    (3 x 3)
 60    (3 x 20)
+30    (10 x 3)
200    (10 x 20)
299
```

You should also use grid method with three digit numbers x two digit numbers before moving to the expanded method.

Stage 4

Children should be confident using long multiplication. If they are fluent with the method they may begin to use short multiplication where appropriate.

```
   53·2
x  24·0
  212·8   (53·2 x 4)
1064·0    (53·2 x 20)
1276·8
```

Brackets can be omitted when no longer required

Division

EYFS

Children will engage in a wide variety of songs and rhymes, games and activities. In practical activities and through discussion they will begin to solve problems involving halving and sharing.

Half of the apples for you and half of the apples for me.

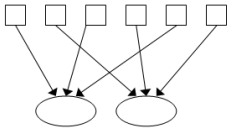
Stage 1
Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.

Calculation Strategy

Children will develop their understanding of division and use jottings to support calculation

✓ **Sharing equally**

6 sweets shared between 2 people, how many do they each get?



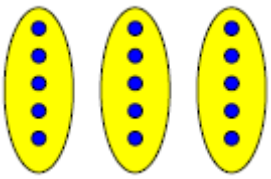
Share these eight apples between two children. How many apples will each child get?

Share 20 crayons between 2 pots.

Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?

How many groups of 5? 15 shared equally between 3 people is…? 15 divided by 5 is 3 15 divided by 3 if 5



Stage 2

During this stage, children will still use sharing and grouping initially but should be moved on to the Cuisenaire rods as the inverse of multiplication. Children should be confident with the use of Cuisenaire rods for multiplication before using for division.

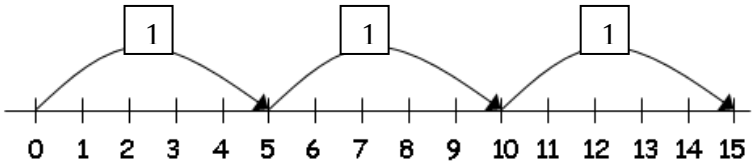
Repeated subtraction using Cuisenaire rods and a number track

12 ÷ 3 =

Calculation Strategy
Step 1: Begin by deciding which number rods they will use to work out the answer. Discuss which number they are dividing and how they know which number rod to choose.
Step 2: Place the rods on the track until they reach the answer.
Step 3: Count how many rods are on the track – discuss how many groups of 3 did we need to reach 12? What is 12 divided by 3? Show how we could also count in groups of 3 to get to 12 verbally.

Following from the practical method, children should be taught to record their answer using a written numberline. This should only be completed when children are confident using the practical method.

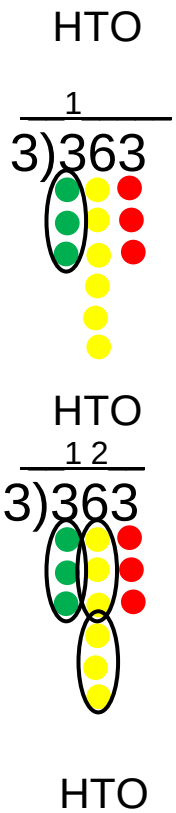
15 ÷ 5 = 3



Ensure that children use the written method alongside the practical method.

Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar.

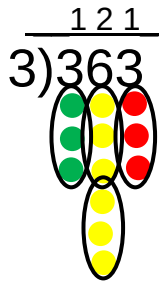
Stage 3
By the end of this stage children should know their times tables and corresponding division facts up to 12x12. Children should continue to use the Cuisenaire rods to divide, this should be done using written methods and practical methods. Remainders should be introduced using the rods, signifying remainders using the ones. Questions should be provided in context, allowing children to explore division in real life contexts.



When children are confident with remainders and division using the Cuisenaire rods they can move onto short method. Initially it will be important to do this practically to support the written. Children will need sound understanding of place value to complete this method effectively. Place value counters will be used to introduce this method.

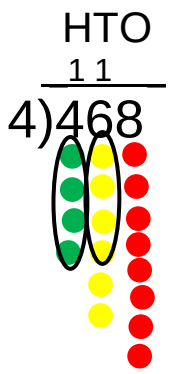
Children need to represent the number using the place value counters. They then need to group the counters according the divisor. They should always start with the hundreds column, every time a column has been grouped they should write how many groups before moving on to the next column.

Calculation Strategy



When the number requires decomposition, it is important for children to know how many ones are in one ten, tens are in one hundred and so on. Children should begin by making the dividend using the place value counters. They need to look at the divisor to find out what they will be making groups of.

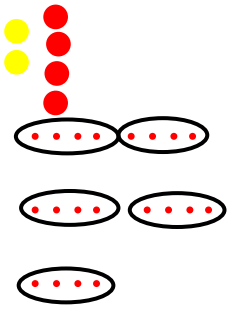
When there aren't any counters left to group in the column, you can move to the next column.



After moving to the tens column and grouping the 6 tens into groups of four there are two tens left over. How many ones should we decompose these tens into? Children should record one group of four tens and decompose the remaining tens into ones.

The remaining counters should be grouped into groups of four. There are seven groups of four. If there are counters left over, these should recorded as remainders.

Calculation Strategy



As the children build confidence using the practical method, the move to formal written method should be introduced. Children should still use the counters to support this transition but during this stage, children should make note of the counters that have been decomposed. They should draw the counters pictorially so to further the move to formal written.

By the end of this stage, children should be confident using short method with or without place value counters to support them. The child should be encourage to decide when they are confident to move to dividing without counters however it is always at the discretion of the teacher whether they are able or not.

Stage 4

Children should continue to practise division using short method to divide numbers of 3, 4, and 5 digits. They should be taught how to divide decimals using this method along with the division of whole numbers leaving a decimal remainder.

Chunking Method

Children should be introduced to long division during this stage. They will initially start using chunking before moving onto a quicker, more efficient method by year 6. It is essential that children understand short division before moving onto long division and they must have a firm understanding of place value.

7895 ÷ 14 =

H T O

14)7 8 9

10 x 14 = 140
5 x 14 = 70
2 x 14 = 28
20 x 14 = 280

Children should begin writing the question out using the bus stop method, they should include place value headers. They should then create a fact box for the 14 x tables. This should be made up of 10 x, 5x, 2x, 20x initially. Children can add facts to this box later should they need to.

7895 ÷ 14 =

HTO

14)789
-280 (x20)
509
-280 (x20)
229

10 x 14 = 140
5 x 14 = 70
2 x 14 = 28
20 x 14 = 280

Children need to decide which group of 14's is the largest (in their fact box), and take this total away from the dividend. It is crucial for children to write the amount of groups in brackets at the side as this is where the answer comes from.

Children should continue to subtract groups of 14 from the running total until they have 13 or less left. When this happens, the bracketed numbers need to be totalled and the number left at the bottom of the subtraction pile is the remainder.

So 789 ÷ 14= 56r5

Calculation Strategy

-140 (x10)
89
-70 (x5)
19
14 (x1)
5

When children are confident with the chunking method they can move onto the shorter method of long division. This is considered an easier method but should not be the first method taught as the longer method allows a deeper understanding and consolidation of previously taught division skills.

789 ÷ 14 =

```
  056
14) 789
   70↓
    89
    84
     5
```

2 x 14 = 28
3 x 14 = 42
4 x 14 = 56
5 x 14 = 70
6 x 14 = 84

When using this method, the children still need a fact box but will not need such large groups. They should begin with 2, 3, 4, 5, 6 groups and then move further through the tables as they require it.

Step 1: How many 14's in 7? Record 0 above H column. How many 14's in 78? 5 x 14 = 70 so the 70 goes beneath the 78 and is subtracted leaving 8. The 5 groups goes in the tens column.
The 9 is then brought down to join the 8 tens that were left. The process is exactly the same. 6 x 14 = 84 so this is subtracted from 89 and there is 5 left over. So the answer is 56r5.

Calculation Strategy
General

- Maths to be recorded one digit per square once squared books are used.
- Build in opportunities to develop pace of calculation through mixed question type.
- Problem solving to be built into lessons and recorded in a specific independent maths book so children can revisit strategies. This will provide useful evidence of application of skills taught for curriculum coverage.
- Column headers to be encouraged where required to consolidate place value in all year groups.
- Games/Practical activities to be built into planning in all year groups to make learning fun and engaging.
- Calculators to be used where appropriate for children to check work, particularly where they have generated their own questions using dice / dominoes or cards.
- All maths to begin with concrete resources, move onto pictorial representation before children are expected to work in the abstract. Resources should be freely available if children wish to use them to consolidate learning or check work.
- Daily calculation should be built into the timetable at least four times a week with the remaining day being used for times table Olympics. Daily calculation should take place in the independent maths books.