



St Andrew's Maths Calculation Policy



This policy has been written using the NCETM Calculation Guidance and the DfE Non-Statutory Guidance.

This policy is to ensure that pupils develop efficient strategies for solving calculations. Efficiency in calculation requires having a variety of mental strategies. Informal methods of recording calculations are an important stage to help children develop fluency with formal methods of recording. Teaching column methods for calculation provides the opportunity to develop both procedural and conceptual fluency. Teachers need to ensure that pupils understand the structure of the mathematics presented in the algorithms, with a particular focus on place value.

Children's conceptual understanding and fluency is strengthened if they experience concrete, visual and abstract representation of a concept during a lesson. Moving between the concrete and the abstract helps children to connect abstract symbols with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of, abstract symbols. CPA is an approach to be used with the whole class and teachers should promote each area as equally valid. Manipulatives in particular must not be presented as a resource to support the less confident or lower attaining pupils. The abstract should run alongside the concrete and pictorial stage as this enables pupils to better understand mathematical statements and concepts. Real things and structured images enable children to understand the abstract. The concrete and the images are a means for children to understand the symbolic so it's important to move between all modes to allow children to make connections. Morgan, D. (2016)

Pupils should be able to choose and use efficient calculations methods for addition, subtraction, multiplication and division. They must also have automatic recall of a core set of multiplicative and additive facts to enable them to focus on learning new concepts.

Some of these steps apply to Year 1 and Year 2 but are part of our Calculation Policy to ensure that we know where the children are coming from during their time at Hatfield Peverel Infant School.

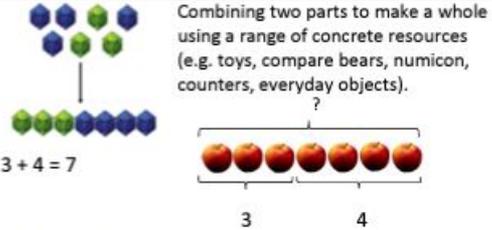
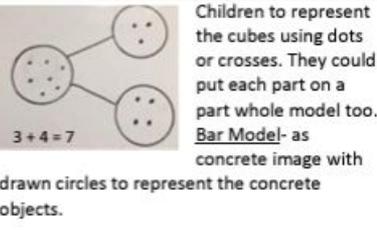
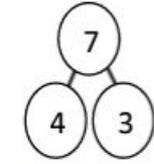
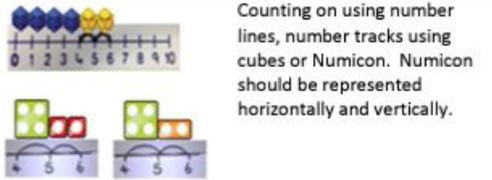
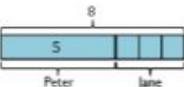
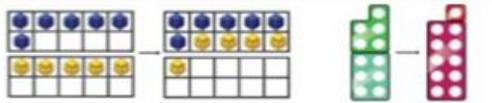
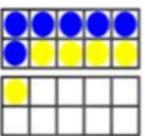
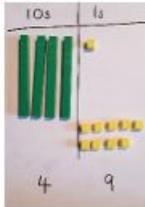
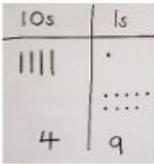
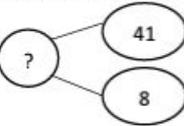
Key representations: Base 10, bead strings, multilink, counters, Numicon, bar model, number lines, ten frames, fingers, place value counters, 100 square

Addition

Each part of the tables on the following slides shows:

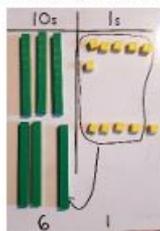
Skills	Concrete	Pictorial	Abstract
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Prior to beginning to explore addition children need to be confident in counting using 1:1 correspondence through a rich experience of counting objects and in a range of contexts (e.g. role play, small world, real life context).

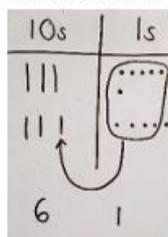
Skills	Concrete	Pictorial	Abstract
<p>1. Combining two parts to make a whole. Add on, more than, bigger, most, increase, part, whole, altogether</p>	<p>Combining two parts to make a whole using a range of concrete resources (e.g. toys, compare bears, Numicon, counters, everyday objects).</p>  <p>$3 + 4 = 7$</p>	<p>Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. Bar Model- as concrete image with concrete image with</p>  <p>drawn circles to represent the concrete objects.</p>	<p>Children use the numerical system and symbols to represent $3+4=7$. Four is a part, three is a part and the whole is seven. The two parts combined make the whole.</p> 
<p>2. Counting on using number lines and tracks. Count on, number line, number track</p>	<p>Counting on using number lines, number tracks using cubes or Numicon. Numicon should be represented horizontally and vertically.</p> 	<p>A bar model which encourages the children to count on, rather than count all.</p>  <p><i>Peter has 5 apples. Jane has 3. How many do they have altogether? $5 + 3 = 8$</i></p>	 <p>The abstract number line: <i>What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$</i></p>
<p>3. Regrouping to make a given number. (Starting with 10). Bonds, counters</p>	<p>Regrouping to make 10; using ten frames and counters/cubes or using Numicon. $6 + 5$. Also use term, 'make 10 strategy.'</p> 	<p>Children to use ten frames and draw circles or crosses to show the two different numbers.</p> 	<p>Children to develop an understanding of equality and that the equal sign is balance- each side of the equals symbol should have the same value. Use balance scales and Numicon to show this (they are weighted for this purpose).</p>
<p>4. Two digit add a one digit. (Partition and place value). Partition, place value</p>	<p>Continue to develop understanding of partitioning and place value using base 10 and place value counters. Put resources on top of place value grid to reinforce place value understanding. Use 10s vertically and 1s in rows of 5 to begin with (as shown- to follow on from tens frame and so children can see bonds to 10), then show in different orientations. $41 + 8 = 49$</p> 	<p>Children to represent the base 10 equipment pictorially (e.g. lines for tens and dots for ones). Ensure children line the lines and dots in the correct place value columns.</p> <p>$41 + 8 = 49$</p> 	<p>Children to use their number fact knowledge and recall to add a single digit to a two digit number. $41 + 8 = 49$ Partition the two digit number (40 and 1). Add the ones ($1+8=9$). Combine the tens and ones ($40 + 9 = 49$).</p> 

5. Two digit add a two digit.
Addition, plus

Continue to develop understanding of partitioning and place value. Begin with adding two two digit numbers with no crossing 10. Then move to crossing, e.g. $36 + 25 = 61$.
Teaching Point: Ten ones are being exchanged for one ten.



Children to represent the base 10 equipment pictorially (e.g. lines for tens and dots for ones). Begin with adding two two digit numbers with no crossing 10. Then move to crossing, e.g. $36 + 25 = 61$.



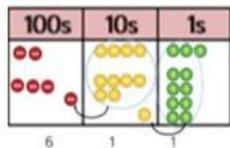
Mentally use partitioning to add (no crossing 10, then crossing 10). $36 + 25 = 61$

$$36 + 25 = 61$$

$$50 + 11 = 61$$

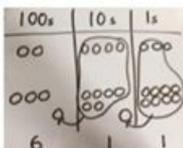
See Progression in Written Methods for Year 2.

6. Introduction to formal written method. Begin with no exchange, one and then two exchanges.
Use of counters and base 10.
Exchange



Children use place value counters and base 10 to add a three digit number to a three digit number. Put counters horizontally in rows of 5- support bonds to 10. Begin with adding with no exchanges, then

exchanges the ones, then exchange the tens, then exchange both tens and ones. **Teaching Point:** When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.



Children to represent the counters in a place value chart. Draw counters horizontally in rows of 5- support bonds to 10. Draw around

counters when they make an exchange. Begin with adding with no exchanges, then exchanges the ones, then exchange the tens, then exchange both tens and ones.

See Progression in Written Methods for Year 3.

See Progression in Written Methods for Year 3-6. Use these examples for CPA.

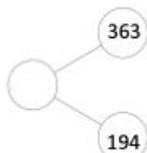
Variation in representing addition

$$363 + 194$$

$$\square = 194 + 363$$

Three hundred and sixty-three plus one hundred and ninety four = ?

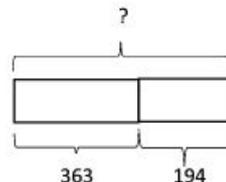
?	
194	363



A school owns 363 chairs. They are then given another 194 by the council. How many chairs do they now have?

True/false?

The sum of 363 and 194 = 569.



Mental Strategies

- Count in thousands, hundreds, tens, ones and hundredths as appropriate
- Reorder numbers in a calculation
- Partition into hundreds, tens and ones and in different ways and recombine by breaking units of 6, 7, 8 or 9 into '5 and a bit' ($724 = 600 + 110 + 14$)
- Add three 1 digit numbers; put the largest number first, using known facts (pairs to 10, doubles)
- Look for near doubles
- Begin to bridge through 10 when, then adjust
- Use known facts and place value to add
- Add 9, 19 and 11 or 21 by rounding and compensating
- Continue to use the relationship between addition and subtraction

St Andrew's written methods of addition:

Partitioning 2d+2d

Children need a secure understanding of place value.

23+52 (no exchange)

T	O	T	O	
2	3	+	5	2
= 75				
2	0		3	
5	0	+	2	
7	0	+	5	
= 75				

Teaching Point

Start with adding ones.
Reinforce place value columns language.

23+59 (1s crossing 10)

T	O	T	O	
2	3	+	5	9
= 82				
2	0		3	
5	0	+	9	
7	0	+	1	2
= 82				

23+59 (exchange 1s)

T	O	T	O	
2	3	+	5	9
= 82				
2	0		3	
5	0	+	9	
8	0	+	2	
= 82				
1	0			

Expanded 2d+2d

23+52 (no exchange)

T	O	
2	3	
5	2	+
	5	
7	0	
7	5	

Teaching Point

Start with adding ones.
 $3+2=5$
 $20+50=70$
Reinforce recording in 1s and 10s place.

23+59 (1s crossing 10)

T	O	
2	3	
5	9	+
	1	2
7	0	
8	2	

Teaching Point

The total of 3 and 9 is 12. The 1 digit in 12 is in the 10s place so the 1 digit is recorded in the 10s column (place).

Compact 2d+2d

23+52 (no exchange)

T	O	
2	3	
5	2	+
7	5	

Teaching Point

After adding 1s reinforce that the 2 and 5 digits are in the 10s column so the total of 7 in the tens columns has a value of 70.

23+59 (exchange 1s)

T	O	
2	3	
5	9	+
8	2	
	1	

Teaching Point

Total of ones is 12 so we exchange 10 ones for 1 ten and this is shown by placing the 1 digit in the tens column (as shown).

74+85 (exchange 10s)

T	O	
7	4	
8	5	+
1	5	9
	1	

Teaching Point

7 tens + 8 tens = 15 tens. Exchange 10 tens for 1 hundred which is recorded in the hundreds column.

46+89 (exchange 1s and 10s)

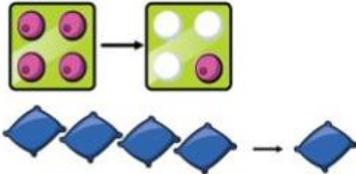
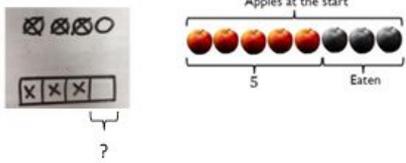
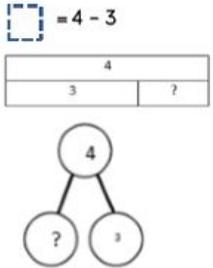
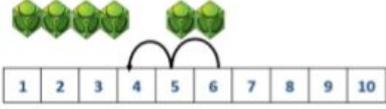
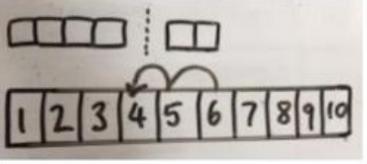
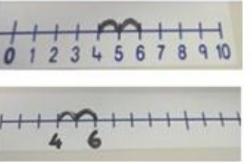
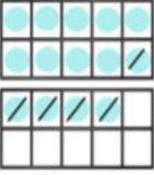
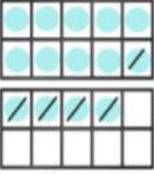
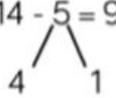
Ensure children progress from no exchange then 1 exchange, 2 exchanges, 3 exchanges, various exchanges.

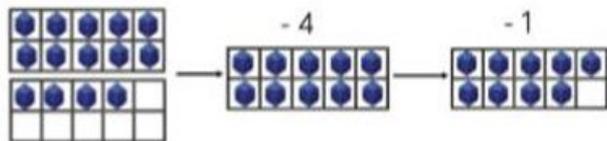
Key representations: Base 10, bead strings, multilink, counters, Numicon, bar model, number lines, ten frames, fingers, place value counters, 100 square

Subtraction

Each part of the tables on the following slides shows:

Skills	Concrete	Pictorial	Abstract
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Skills	Concrete	Pictorial	Abstract
<p>1. Physically taking away and removing objects from a whole</p> <p>Take away, left less than, smaller, least, decrease, fewer</p>	<p>Ten frames, Numicon, cubes and other items such as beanbags could be used to explore physically taking away and counting how many are left.</p> <p>$4 - 3 = 1$</p> 	<p>Children to draw the concrete resources they are using and cross out the amount they are subtracting. The bar model should also be used. Bar model to show 1:1 correspondence where each part of the bar represents one physical object.</p> 	<p>$4 - 3 =$</p> 
<p>2. Counting back</p> <p>Count back, number line, number track</p>	<p>Using number lines or number tracks to count back.</p> <p>$6 - 2 = 4$</p> 	<p>Children to represent what they see pictorially e.g:</p> 	<p>Children to represent the calculation on a number line or number track to show their jumps. Move onto an empty number line.</p> 
<p>3. Making 10 and using number bonds.</p> <p>Bonds, partition</p>	<p>Using ten frames: $14 - 5$. Begin by making 14 on a tens frame, reinforcing 10 and 4 ones. Then subtract 4 (from the 4 on the ten frame). How many more do we need to subtract? (1). Take the one away from the 10.</p> 	<p>Children to present the ten frame pictorially, they should subtract from the ones first then full ten frame.</p> 	<p>Children to show how they can make 10 by partitioning the subtrahend. Children may do this mentally without recording as shown but must be able to verbalise their mental calculation.</p> <p>$14 - 5 = 9$</p>  <p>$14 - 4 = 10$ $10 - 1 = 9$</p>

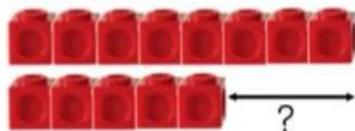


4. Finding the difference

Difference between, count on

Using physical resources (e.g. Numicon, cubes, Cuisenaire). Begin with finding the difference between single digits.

Calculate the difference between 8 and 5.

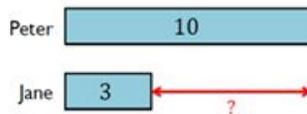


Chn to also explore counting on on a number track and number line.

$12 - 5 =$ Start at 5 and count on to 12. How many jumps have you counting on? (7)



Children to draw the cubes or other concrete objects which they have used and use the bar model to illustrate what they need to calculate. For the bar model begin with 1:1 correspondence (bar split into 10 equal parts for Peter and bar split into 3 parts for Jane). Each individual part need to be the same length. Question marks shows the difference.



Find the difference between 8 and 5.

$8 - 5$, the difference is

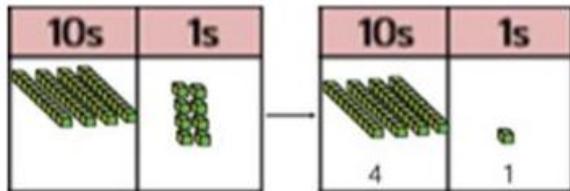
Children to explore why $9 - 6 =$, $8 - 5 =$ and $7 - 4 =$ have the same difference.

5. Two digit subtract ones, then two digit subtract tens.

Subtraction, minus, take away.

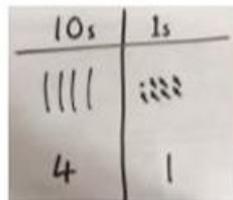
Using base 10 on a place value grid. Place value understanding should be consistently reinforced. Use 10s vertically and 1s in rows of 5 to begin with (to follow on from tens frame and so children can see bonds to 10).

$48 - 7 = 41$



Children to represent the base 10 pictorially (e.g. lines for tens and dots for ones). Children should record the 10s vertically and 1s in rows of 5 to begin with. Cross off the ones subtracted. How many ones are left? Record in ones place. How many tens are left?

Record in tens place.



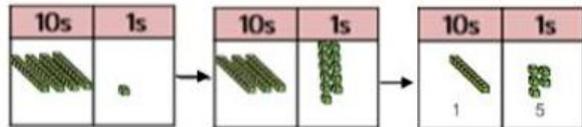
Children to mentally count back to subtract.

6. Two digit subtract two digit. Begin with no exchange then move to exchanging one ten for ten ones.

Exchange, place value columns, subtraction, subtrahend.

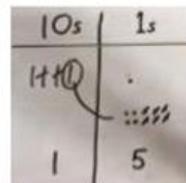
Using base 10 on a place value grid. Place value understanding should be consistently reinforced. Use 10s vertically and 1s in rows of 5 to begin with (to follow on from tens frame and so children can see bonds to 10). Begin with two digit subtract two digit with no exchanging. Partition the subtrahend, physically take ones first then tens (same order as formal written). How many ones are left? How many tens are left? (Record in correct place)

$$41 - 26 = 15$$



Children to represent the base 10 pictorially (e.g. lines for tens and dots for ones). Children should record the 10s vertically and 1s in rows of 5 to begin with. Cross off the ones subtracted first then tens (same order as concrete).

When exchanging circle the one ten and draw an arrow to the ones column, record ten ones there. Then subtract the subtrahend ones and then tens.



Mentally use partitioning to subtract. Partition the subtrahend. E.g:

$$\begin{aligned} 38 - 17 &= 21 \\ 38 - 10 &= 28 \\ 28 - 7 &= 21 \end{aligned}$$

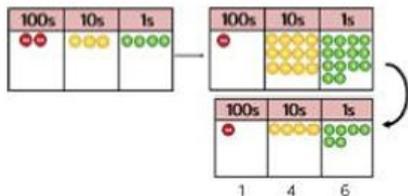
See Progression in Written Methods for Year 2.

7. Introduction to formal written method.

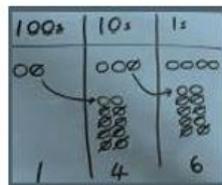
Begin with no exchange, one exchange and then two exchanges.

Using place value counters. Represent the number subtracting from with place value counters and place on place value grid. Children physically exchange (e.g. one tens for ten ones, one hundred for ten tens) then physically take away.

$$234 - 88$$



Representing the place value counters pictorially, children must record the exchange.

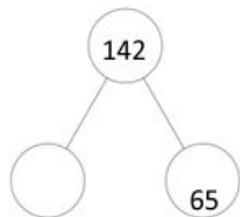


See Progression in Written Methods for Year 3.

See Progression in Written Methods for Year 3-6. Use these examples for CPA.

Conceptual variation:

$142 - 65$



142	
65	

There are 142 pencils in a box but 65 have been broken. How many pencils are left to use?

$142 - 65 = \square$

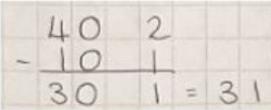
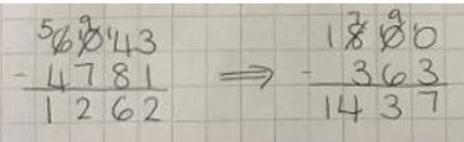
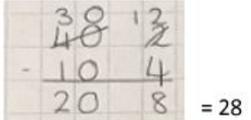
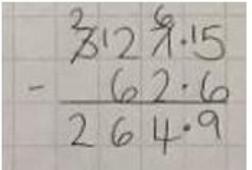
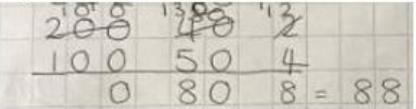
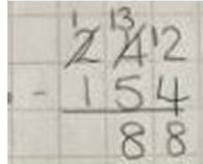
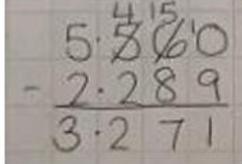
$142 - \square = 65$

Find the difference between 65 and 142.

Mental Strategies:

- Count back in hundreds, tens or ones
- 1 less than a number, 10 less than a number
- Subtract mentally a near multiple of 10
- Find a small number by counting back
- Find a difference by counting up from the smaller number to the larger number (on a number line)
- Bridge through a multiple of 10 and then adjust
- Use knowledge of number facts and place value to subtract pairs of numbers
- Subtract a 2-digit number by partitioning it and then subtracting its tens and ones
- Use the relationship between addition and subtraction

St Andrew's written methods of subtraction:

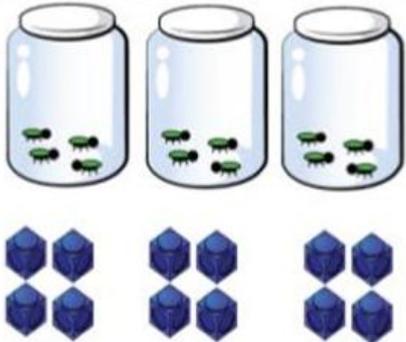
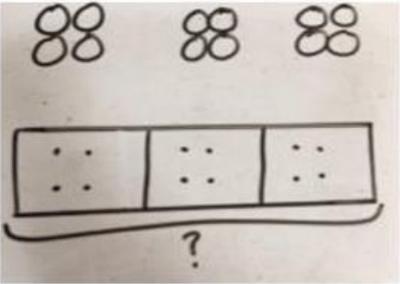
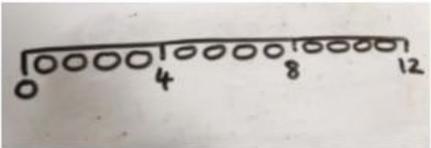
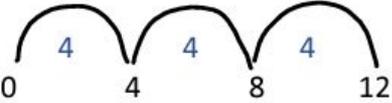
<p>1. Expanded – no exchange 42 - 11</p> 	<p>Teaching Point Partition each number and set out as shown. Children need to start with the subtracting the ones place value column to lead into the formal written method.</p>	<p>4. Include zero in a range of place value columns positions and more than one zero.</p> 	<p>Teaching Point Include examples where there are a mixed number of digits. Ensure children line the digits up in the correct columns.</p>
<p>2. Expanded – 1 exchange 42 - 14</p> 	<p>Teaching Point You are exchanging one ten for tens ones – make this vocabulary explicit. This should be secure from concrete stages first.</p>	<p>5. Decimals 327.5 – 62.6</p> 	<p>Teaching Point Children must include the decimal point in the subtraction and below the equal sign, line them up like buttons on a shirt. Include examples with mixed number of digits before the decimal point and include mix of whole numbers and those with decimal places.</p>
<p>3. Expanded – 2 exchanges 242 – 154</p> <p>Expanded:</p>  <p>Then compact:</p> 	<p>Teaching Point You can progress to compact method at any step once the child is secure with their place value.</p>	<p>6. Decimals to 3d.p in context 5.560 – 2.289</p> 	<p>Teaching Point Include examples where there are mixed number of decimal places. Ensure children line the digits up in the correct columns. Encourage children to use zero as a placeholder to support exchanging as needed.</p>

Key representations: place value counters, base 10, bead strings, multilink, counters, Numicon, bar model, number line

Multiplication

Each part of the tables on the following slides shows:

Skills	Concrete	Pictorial	Abstract
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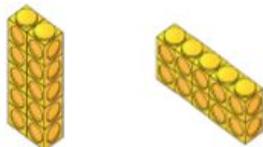
Skills	Concrete	Pictorial	Abstract
<p>1.Repeated grouping/ repeated addition</p> <p><i>grouping, equal groups, group, part, equal, repeated addition</i></p> <p>How many times?</p>	<p>3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group.</p> 	 <p>Children to represent the practical resources in a picture and use a bar model. <i>Sentencee stem: There 3 groups. There are 4 in each group. Altogether, there are 12 circles/ dots.</i></p>	<p>$3 \times 4 = 12$ $4 + 4 + 4 = 12$</p> <p><i>We are adding 4 three times.</i></p>
<p>2.Number lines to show repeated groups</p> <p><i>groups, groups of, lots of, multiply, multiplied by, times, steps, equal</i></p>	<p>$3 \times 4 = 12$</p>  <p><i>We can represent the groups of 4 using the Numicon shape 4. There are three 4s. Children count in 4s or lay 10 and 2 Numicon pieces over the top to find the total</i></p> <p>Cuisenaire rods could also be used.</p>	<p>Abstract number line representing the three groups of four.</p> 	<p>Abstract number line showing three jumps of four.</p> <p>$3 \times 4 = 12$</p> 

3. Use arrays to illustrate commutativity

array, lots of, groups of, commutative, repeated addition, row, column

Counters, objects, Numicon pegs and other objects can be used.

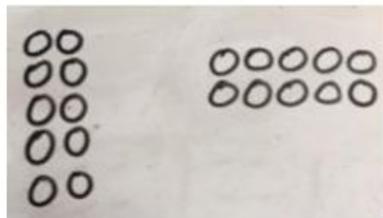
$$2 \times 5 = 5 \times 2$$



2 lots of 5

5 lots of 2

Children to represent arrays pictorially.



What's the same? What's different?

Children to be able to use an array to write a range of calculations, e.g:

$$\begin{aligned} 10 &= 2 \times 5 \\ 5 \times 2 &= 10 \\ 2 + 2 + 2 + 2 + 2 &= 10 \\ 10 &= 5 + 5 \end{aligned}$$

4. Partition to multiply

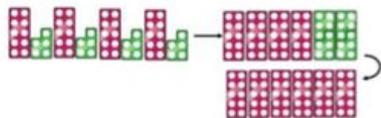
partition, tens, ones, value, groups of, lots of, multiply, multiplied by, times, derive

product, scale up

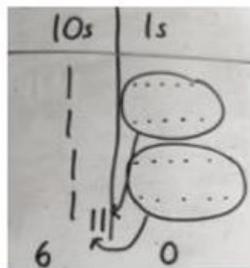
commutativity
associativity

Partition to multiply using Numicon, Base 10 or Cuisenaire rods.

$$4 \times 15$$



Children to represent the manipulatives pictorially.



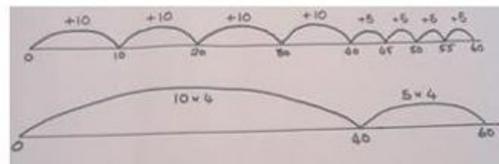
1. No exchange.
2. Exchange ones.

Children should be encouraged to show their process:

$$\begin{array}{r} 4 \times 15 \\ \swarrow \searrow \\ 10 \quad 5 \end{array}$$

$$\begin{aligned} 10 \times 4 &= 40 \\ 5 \times 4 &= 20 \\ 40 + 20 &= 60 \end{aligned}$$

A number line might be used alongside. Children move to applying their times table knowledge to using efficient jumping (second number line).

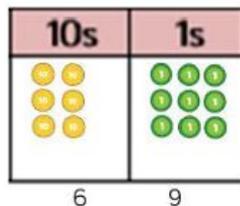


5. Introduction to formal written method

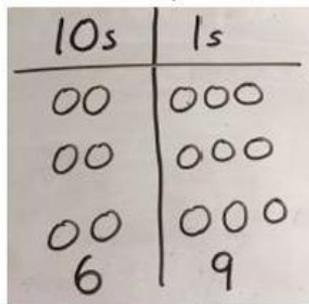
partition, tens, ones, place value

Using place value counters (Base 10 could also be used).

3×23



Children represent the place value counters pictorially.



Children record their process to show their understanding.

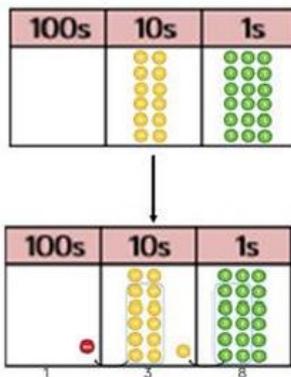
$$\begin{array}{r} 3 \times 23 \\ \swarrow \quad \searrow \\ 20 \quad 3 \end{array} \quad \begin{array}{l} 3 \times 20 = 60 \\ 3 \times 3 = 9 \\ 60 + 9 = 69 \end{array}$$

$$\begin{array}{r} 23 \\ \times 3 \\ \hline 69 \end{array}$$

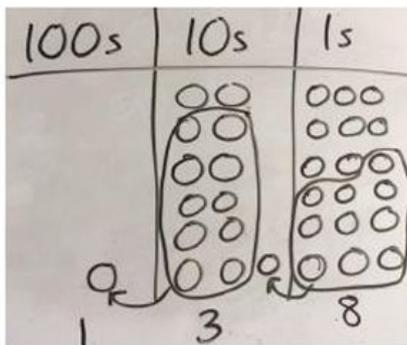
6. Formal written method continued.

Using place value counters (Base 10 could also be used).

6×23



Children to represent the counters/ Base 10 pictorially.



$6 \times 23 =$

$$\begin{array}{r} 23 \\ \times 6 \\ \hline 138 \\ \hline 1 \quad 1 \end{array}$$

$$\begin{array}{r} 1 \quad 2 \quad 4 \\ \times \quad 2 \quad 6 \\ \hline 7 \quad 4 \quad 4 \\ \\ 2 \quad 4 \quad 8 \quad 0 \\ \hline 3 \quad 2 \quad 2 \quad 4 \\ \hline 1 \quad 1 \end{array}$$

Answer: 3224

Conceptual Variation: different ways to ask children to solve 6×23

23	23	23	23	23	23
----	----	----	----	----	----

?

Mai had to swim 23 lengths, 6 times a week.

How many lengths did she swim in one week?

With the counters, prove that $6 \times 23 = 138$

Find the product of 6 and 23

$$6 \times 23 =$$

$$\square = 6 \times 23$$

$$\begin{array}{r} 6 \quad 23 \\ \times \underline{23} \quad \times \underline{6} \\ \hline \end{array}$$

What is the calculation?
What is the product?

100s	10s	1s
		

Mental Strategies

- Counting in multiples
- Repeated addition
- Arrays
- Links to doubling, including doubles to link $\times 2$, $\times 4$ and $\times 8$ tables
- Reorder calculation (**commutative**)
- Using known facts and place value
- Use the rule of **associativity**
- Scaling up using known facts
- Using the relationship between multiplication and division
- Use partitioning and **Distributive Law** to multiply
- Use **factor pairs** and the **Associative Law** to multiply
- Recognise and use square and cube numbers

St Andrew's written methods of multiplication:

Grid Method

20×3

$$\begin{array}{r|l} \times 20 & 6 \\ \hline 3 & 60 \end{array} \begin{array}{r|l} 6 & 18 \\ \hline & 18 \end{array} = 78$$

Expanded form

135×6

$$\begin{array}{r} 135 \\ \times 6 \\ \hline 30 \\ 180 \\ 600 \\ \hline 810 \end{array}$$

Teaching Point

Do not stay here. Quickly progress onto compact as soon as possible

Multiplying decimals by integers – apply context of money and measure

$$\begin{array}{r} 784.9 \\ \times 6 \\ \hline 4909.4 \end{array}$$

Teaching Point

Ignore DP to start with. Complete calculation and then count DP back in e.g. 1DP in questions means = 1DP in answer.

4 digit multiplied by a 1 digit

$$\begin{array}{r} 2513 \\ \times 7 \\ \hline 17591 \end{array}$$

3 2

$$\begin{array}{r} 47.3 \\ \times 62 \\ \hline 946 \\ 28380 \\ \hline 2932.6 \end{array}$$

Long multiplication

Teaching Point

Make Place value explicit. You are multiplying by 30 not 3. Multiples of 10 end in a zero, we can add the zero at the start.

$$\begin{array}{r} 27 \\ \times 34 \\ \hline 108 \\ 810 \\ \hline 918 \end{array} \quad \rightarrow \quad \begin{array}{r} 2374 \\ \times 32 \\ \hline 4748 \\ 70220 \\ \hline 74968 \end{array}$$

Teaching Point

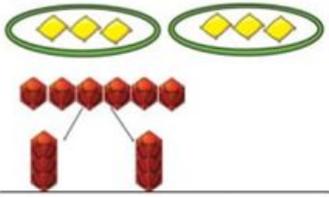
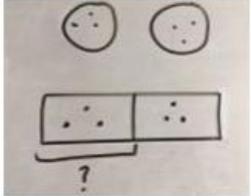
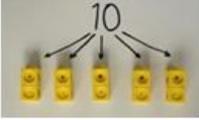
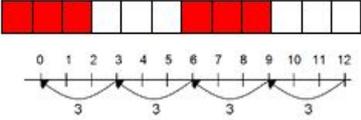
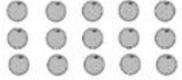
Ignore DP. Make it clear to line up as normal 3 digit x 2 digit, then count in DP after, otherwise place value is confused and method can become compromised.

Key representations: place value counters, base 10, bead strings, multilink, counters, Numicon, bar model, number line

Division

Each part of the tables on the following slides shows:

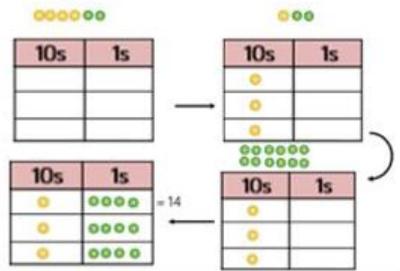
Skills	Concrete	Pictorial	Abstract
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Skills	Concrete	Pictorial	Abstract
<p>1. Sharing into equal groups</p> <p>each, share, equally, equal, same, group</p>	<p>$6 \div 2$</p>  <p>Sharing six into two groups. Each group needs to be equal.</p>	<p>Pictorial</p>  <p>Draw two groups (circles or bar model), share the whole (6) into the two groups one at a time. Check both groups are equal (same value). How many is in each group? (3)</p>	<p>Abstract</p>  <p>Using the number 3 to show the value of each of the two equal groups through a bar model. Children may pictorially share first then record the numerical value.</p>
<p>2. Division as grouping</p> <p>groups of, divide, number line, array, number of groups</p>	<p>$10 \div 2 = 5$</p> <p>Divide 10 into equal groups of 2. Use cubes, counters or objects to aid understanding. How many needs to be in each group? How many groups are there?</p> 	<p>$12 \div 3 = 4$</p> <p>Use a bar model to build groups of 3. Then use a number line to show jumps in groups of 3, starting from 12 backwards to 0. The number of jumps equals the number of groups.</p> 	<p>Divide 28 into 7 groups. $28 \div 7 = 4$</p> <p>How many are in each group?</p> <p>Abstract number line to show the jumps in groups of 7 from 28 to zero.</p> 
<p>3. Division within arrays</p> <p>array, groups of, number of groups, rows, columns</p>	<p>Link multiplication to division by creating an array and considering the different number sentences.</p> <p>$15 \div 5 = 3$</p> <p>$15 \div 3 = 5$</p> <p>There are 5 groups of 3.</p> <p>There are 3 groups of 5.</p> 	<p>Draw arrays and use lines as necessary to split into groups. Can you record the related division calculations to match?</p> 	<p>Find the inverse of multiplication and division sentences by creating four linking number sentences.</p> <p>$3 \times 5 = 15$</p> <p>$5 \times 3 = 15$</p> <p>$15 \div 5 = 3$</p> <p>$15 \div 3 = 5$</p>

4. Sharing using place value counters (two digit ÷ one digit)

place value, counters, exchange, remain, remainder, multiple,

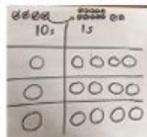
$42 \div 3 = 14$



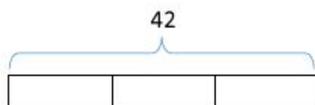
Represent 42, share 10s into 3 groups, share 1s into three groups.

1. No exchange.
2. Exchange one 10 for ten ones and share.

Convert from physical manipulation of place value counters to drawing in the grid

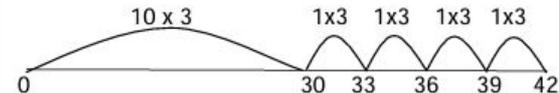


Refine bar model to show groups.

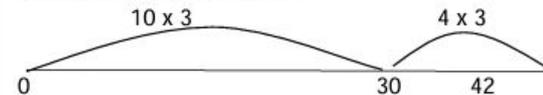


Division through chunking applying times table knowledge.

$42 \div 3$



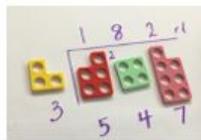
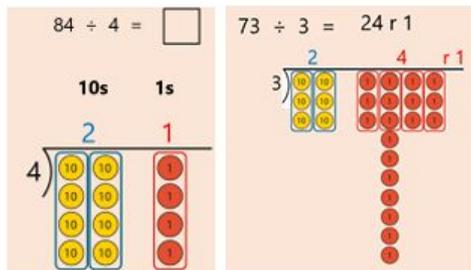
Progress to efficient 'chunks'.



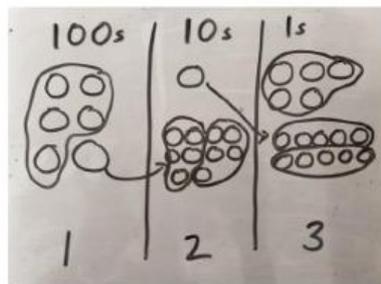
5. Short division

inverse, divisible by, carry, short division, factor, how many groups of ___ in ___, remainder as fraction

Counters then Numicon, no remainder, then remainder, then remainder in context.



Represent the counters pictorially.

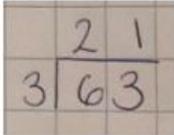
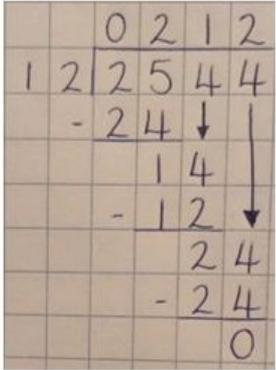
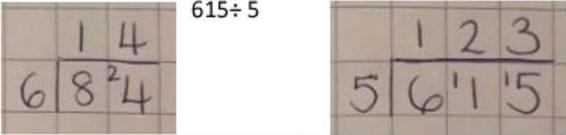
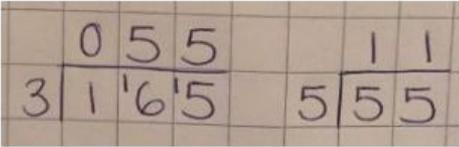
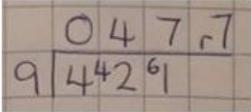
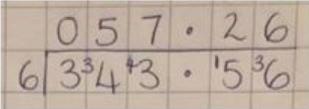


Children can now use the short division method and carry remainders numerically to complete the calculation. Include zeros.

$$5 \overline{) 615} \begin{matrix} 123 \\ \\ \end{matrix}$$

See Progression in Written Methods for Year 3-6. Use these examples for CPA.

St Andrew's written methods of division:

<p>1. Short division (no carrying) $63 \div 3$</p> 		<p>5. Long division $2544 \div 12$</p> 	<p>Teaching Point</p> <p>Children apply their learning of short division, and write the groups underneath to use column subtraction to calculate a remainder. The next digit then meets the remainder rather than carrying the remainder over.</p> <p>For decimal long division, include the decimal point before solving the calculation.</p>
<p>2. Short division (carrying remainders) $84 \div 6$ $615 \div 5$</p> 		<p>5a. Alternative method: factor pairs (Double bus stop) $165 \div 15$</p> 	<p>Teaching point</p> <p>Children record a factor pair of the two digit divisor and complete two short division calculation in place of long division.</p> <p>N.B. This does not work if the divisor is prime.</p>
<p>3. Short division with remainders $421 \div 9$</p> 	<p>Teaching Point</p> <p>Ensure that children are taught how to represent remainders – see progression below.</p>		
<p>4. Short division with decimal points $343.56 \div 6$</p> 	<p>Teaching Point</p> <p>Ensure children record the decimal point clearly.</p>		

Progression for remainders

1. No remainder
2. Remainder as a number
3. Remainder as a fraction
4. Remainder as a decimal