Newquay Primary Academy

Calculation Policy

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Adopted by (body): **Local Governing Body**
Approved (date): **01/09/2022**
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This policy is intended to demonstrate how we teach different forms of calculation at Newquay Primary Academy. It is organised by year groups although some higher ability children may use methods from later year groups. In the KS2 tests at the end of year 6, children are expected to use written formal methods for all four operations (addition, subtraction, multiplication and division).

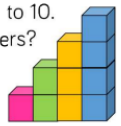
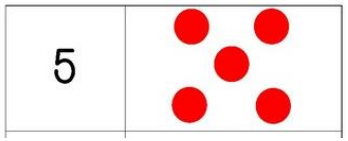
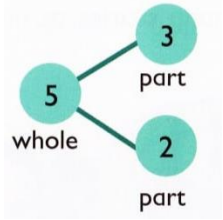
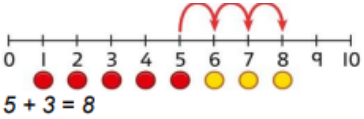
This policy is designed to help teachers and staff members at the school ensure that calculation is taught consistently across the school and to aid them in helping children who may need extra support or challenges.

This policy is also designed to help parents, carers and other family members support children's learning by letting them know the expectations for their child's year group and by providing an explanation of the methods used in our school.

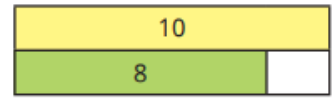
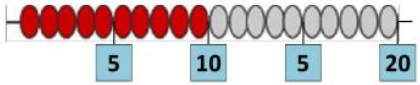
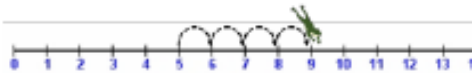
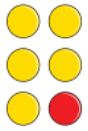
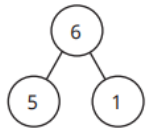
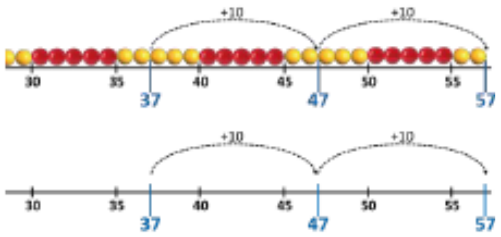
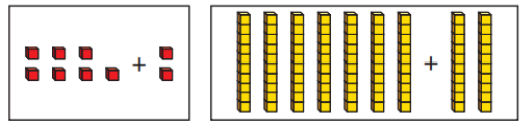
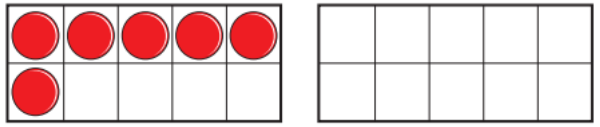
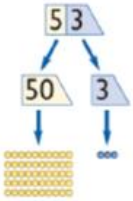
Contents

EYFS Mathematics

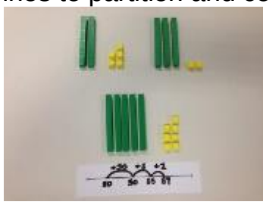
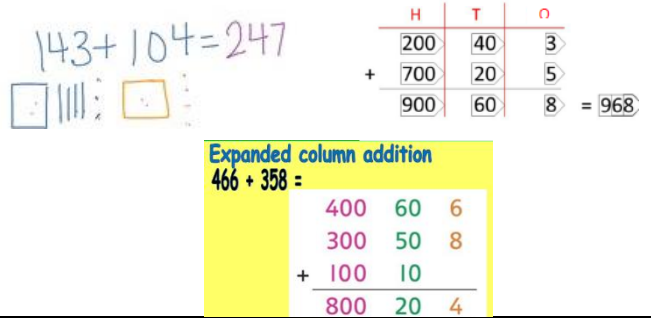
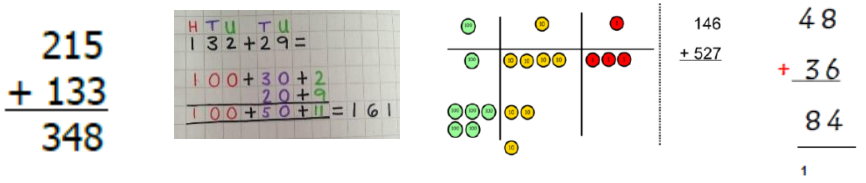
Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Year	Curriculum Statutory Requirements	Strategies
EYFS	**ELG: Number** **Children at the expected level of development will:** • **Have a deep understanding of number to 10, including the composition of each number;** • **Subitise (recognise quantities without counting) up to 5;** • **Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.**	 Use cubes to build towers from 1 to 10. Can the children order the towers? What do they notice?   
	ELG: Numerical Patterns **Children at the expected level of development will:** • **Verbally count beyond 20, recognising the pattern of the counting system;** • **Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;** • **Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.**	 *One more than 4 is 5.*  *5 + 3 = 8*  

Newquay Primary Academy Progression in Calculation – Addition

Year		
Year 1	**Year 1** • Read, write and interpret mathematical statements involving addition (+) and equals (=) signs and relate this to balance sums and scales • Represent and use number bonds and related subtraction facts within 20 • Add one-digit and two-digit numbers to 20, including zero • Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 9 = □ + 7.	     
Year 2	**Year 2** • Solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures, and applying their increasing knowledge of mental and written methods • Recall and use addition facts to 20 fluently, and derive and use related facts up to 100 • Add numbers using concrete objects, pictorial representations and mentally, including: - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers • Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	     ers does Ann need to make 20?
Vocabulary +, add, more, plus, make, sum, total, altogether, double, near double, one more, two more… ten more, how many more to make…? how many more is… than…? how much more is…?		**Key resources**

Newquay Primary Academy Progression in Calculation - Addition

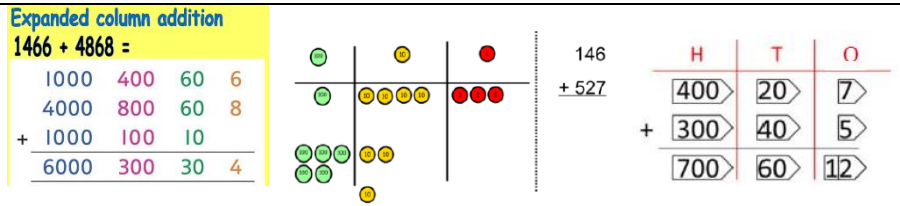
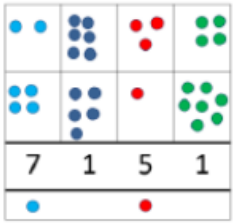
Year	Curriculum Statutory Requirements	Steps to success	Strategies
Year 3	**By the end of the year, pupils should be taught to:** • **Add numbers mentally including**: - a 3-digit number and ones - a 3-digit number and tens - a 3-digit number and hundreds • **Add numbers with up to three digits, using formal written methods of columnar addition** • **Estimate the answer to a calculation and use inverse operations to check answers** • **Solve problems, including missing number problems, using number facts, place value, and more complex addition.**	**Step 1** - I can add a three-digit number and 1's mentally. - I can add numbers with up to 3-digit numbers informally. - I can begin to estimate the answer to a question.	Using diennes to partition and count a total 
		Step 2 - I can add a three-digit number and 10s (HTU+TU) mentally. - I can add number with up to 3 digits using a formally written method of columnar addition without bridging ten. - I can estimate the answer to my calculation and say whether the answer is likely.	Moving towards drawing pictorial representations of diennes and partitioning 3 digit numbers to add. 
		Step 3 - I can add a three-digit number and 100s (HTU+HTU) mentally. - I can add numbers with up to 3 digits using formal methods of columnar addition (moving towards an understanding of bridging to another place value column). - I can link number facts to other calculations (e.g. 6 + 8 =14, 8 + 6 = 14, 14 – 6 = 8, 14 – 8 =6). - I can solve 1 step problems in context, deciding which operation and methods to use and why.	Exploring expanded column method as they move towards the formal compact column method. 

Vocabulary

+, add, addition, more, plus, make, sum, total, altogether, double, near double, one more, two more… ten more… one hundred more, how many more to make …? how many more is… than …? how much more is…?
=, equals, sign, is the same as

Key resources

Newquay Primary Academy Progression in Calculation - Addition

Year	Curriculum Statutory Requirements	Steps to success	Strategies
Year 4	**By the end of the year, pupils should be taught to:** • **Add with up to 4 digits using the formal written methods of columnar addition where appropriate.** • **Estimate and use inverse operations to check answers to a calculation** • **Solve two-step problems addition in contexts, deciding which operations and methods to use and why.**	**Step 1** - I can add 3-digit numbers using columnar addition (including bridging 10). - I can solve simple addition problems.	
		Step 2 - I can add 3-digit numbers using columnar addition (including bridging 10 and 100). - I can find fact families for an addition fact. - I am beginning to estimate the answer to a calculation - I can solve one-step problems in contexts, deciding which operations to use and why	215 + 133 8 (5 + 3 = 8) 40 (10 + 30 = 40) 300 (200 + 100 = 300) 348 
		Step 3 - I can add up to 4-digit numbers using columnar addition (including bridging 100) - I can use inverses in number problems (e.g. I think of a number and add 3) - I can estimate the answer to a calculation and say whether my answer is likely - I can solve more complex one-step problems in contexts, deciding which operations to use and why	47 + 76 = 123 (11) 258 + 87 = 345 (11) 366 + 458 = 824 (11)
Vocabulary add, addition, more, plus, increase, sum, total, altogether, double, near double, how many more to make…? tens boundary, hundreds boundary, inverse, =, equals sign, is the same as			**Key resources**

Newquay Primary Academy Progression in Calculation - Addition

<table>
<tr><th>Year</th><th>Curriculum Statutory Requirements</th><th>Steps to success</th><th>Strategies</th></tr>
<tr><td rowspan="3">Year 5</td><td rowspan="3">By the end of the year, pupils should be taught to:

• Add whole numbers with more than 4 digits, including using formal written methods (columnar addition)

• Add numbers mentally with increasingly large numbers

• Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

• Solve addition multi-step problems in contexts, deciding which operations and methods to use and why</td><td>Step 1
- I can add and subtract 4-digit numbers using columnar addition (including bridging 10/100/1000)
- I can add mentally a three-digit number and a single digit number
- I can solve one-step problems in contexts, deciding which operations to use and why</td><td>NC – end of year 6 expected method (examples from NC)
789 + 642 becomes

7 8 9
+ 6 4 2
1 4 3 1
1 1

Answer: 1431</td></tr>
<tr><td>Step 2
- I can add and subtract 4-digit numbers using columnar addition (including bridging 10/100/1000)
- I can add mentally a three-digit number and a multiple of 10
- I am beginning to use rounding to +estimate the answer to a calculation
- I can solve more complex one-step problems in contexts, deciding which operations to use and why</td><td>To answer 3252 + 3700, I can round to the nearest hundred or thousand to estimate the answer.

TTh Th H T O
4 3 2 0 1
2 2 1 2 4
+ 3 1 3 2 1
9 6 6 4 6</td></tr>
<tr><td>Step 3
- I can add and subtract 4-digit numbers using columnar addition (including bridging 10/100/1000
- I can add mentally a three-digit number and a multiple of a hundred
- I can estimate the answer to a calculation using rounding and say whether my answer is likely
- I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why</td><td>The answer to this calculation is likely to be near £31 because 24 + 7 = 31.

£ 2 3 . 5 9
+ £ 7 . 5 5
£ 3 1 . 1 4
1 1 1</td></tr>
<tr><td colspan="2">Vocabulary
add, addition, more, plus, increase, sum, total, altogether, double, near double, how many more to make...? inverse, primes, prime factors, composite numbers
equals, sign, is the same as</td><td colspan="2">Key resources</td></tr>
</table>

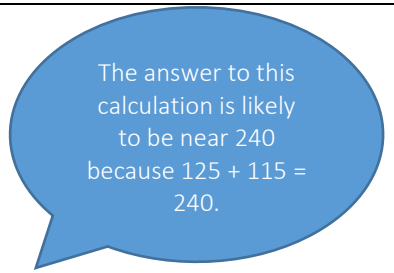
Newquay Primary Academy Progression in Calculation - Addition

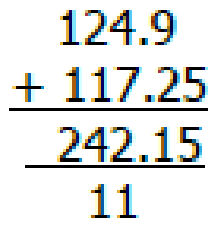
Year	Curriculum Statutory Requirements	Steps to success	Strategies

<table>
<tr>
<td>Year 6</td>
<td>By the end of the year, pupils should be taught to:

• Solve addition multi-step problems in contexts, deciding which operations and methods to use and why

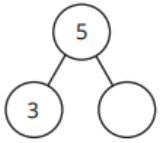
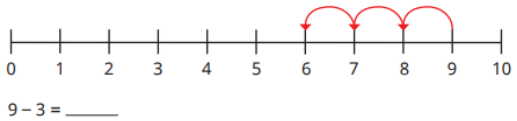
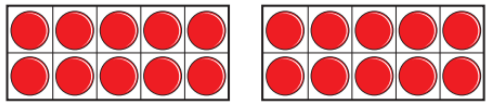
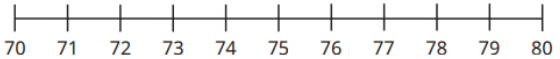
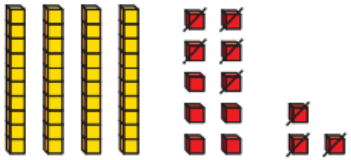
• Solve problems involving addition

• Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</td>
<td>Step 1
- I can add and subtract 5-digit numbers using columnar addition (including bridging 10/100/1000/10000).</td>
<td>NC – end of year 6 expected method (examples from NC)
789 + 642 becomes
 
Answer: 1431</td>
</tr>
<tr>
<td></td>
<td>Step 2
- I can add and subtract 5-digit numbers with decimals using columnar addition (including bridging 10/100/1000/10000).
- I can add and subtract multiples of 10 and 100 to three- and four-digit numbers mentally.
- I can use brackets in simple calculations.
- I can solve more complex one step problems in context deciding which operations to use and why.
- I can check whether my answer is likely.</td>
<td> 

  </td>
</tr>
<tr>
<td></td>
<td>Step 3
- I can add and subtract numbers of different lengths with decimals using columnar addition (including bridging where necessary).
- I can add and subtract numbers mentally with increasingly large numbers.
- I can use brackets and inverses effectively e.g. (24+P) x 6 = 150.
- I can solve addition and subtraction twostep problems in context deciding which operations and methods to use and why.
- I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</td>
<td>Numbers can be carried above or below but should be crossed out when they have been added.
  </td>
</tr>
<tr>
<td colspan="2">Vocabulary
add, addition, more, plus, increase, sum, total, altogether, double, near double, how many more to make...? inverse, primes, prime factors, composite numbers equals, sign, is the same as</td>
<td colspan="2">Key resources</td>
</tr>
</table>

Newquay Primary Academy Progression in Calculation – Subtraction

Year	Curriculum Statutory Requirements	Strategies

Year 1	• **Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs** • **Represent and use number bonds and related subtraction facts within 20** • **Subtract one-digit and two-digit numbers to 20, including zero** • **Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 9 = □ - 7.**	 There are 6 apples. 5 of them are red and 1 is green. Write the fact family to show this.  
Year 2	• **Solve problems with subtraction:** **using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods** • **Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100** • **Subtract numbers using concrete objects, pictorial representations, and mentally, including:** **- a two-digit number and ones** **- a two-digit number and tens** **- two two-digit numbers** • **Subtracting three one-digit numbers** • **Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot** • **Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.**	The ten frames show 20  Use the ten frames to work out the subtractions. 20 – 4 20 – 7 20 – 2 Here is a number line.  Use the number line to work out the subtractions. 80 – 4 80 – 7 80 – 2 base 10 to work out 53 – 8 

Vocabulary	Key resources
+, add, more, plus, make, sum, total, altogether, double, near double, one more, two more… ten more, how many more to make…? how many more is… than…? how much more is…?	

Newquay Primary Academy Progression in Calculation – Subtraction

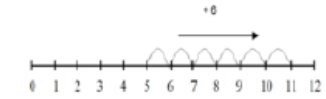
Year	Curriculum Statutory Requirements	Steps to success	Strategies

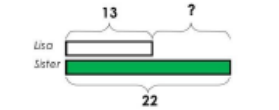
<table>
<tr>
<td>Year 3</td>
<td>By the end of the year, pupils should be taught to:

• Subtract numbers mentally, including:
- a three-digit number and ones
-a three-digit number and tens
- a three-digit number and hundreds

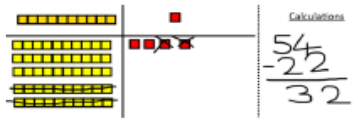
• Subtract numbers with up to three digits, using formal written methods of columnar subtraction
• Estimate the answer to a calculation and use inverse operations to check answers
• Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.</td>
<td>Step 1
- I can subtract up to 3-digit numbers informally
- I can begin to estimate the answer to a calculation

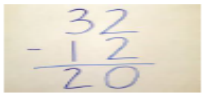
Step 2
- I can subtract numbers with 2 digits, using formal written method of columnar subtraction without bridging 10
- I can estimate the answer to a calculation and say whether my answer is likely
- I can solve simple subtraction problems

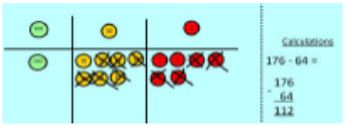
Step 3
-I can subtract numbers with 3 digits, using the formal written method of columnar subtraction
- I can make all related number sequences (e.g. 14 – 6 = 8, 14 – 8 = 6, 6+8=14, 8+6=14)
- Solve one step problems in context, deciding which operations and methods to use and why</td>
<td> 
Count on to find the difference.

Comparison Bar Models
Draw bars to find the difference between 2 numbers.
 

47 – 24 = 23
40 + 7
– 20 + 4
20 + 3

 
Draw the Base 10 or place value counters alongside the written calculation to help to show working.

This will lead to a clear written column subtraction.
 

247 – 122 = 125 subtraction

200+40+7
100+20+2
100+20+5

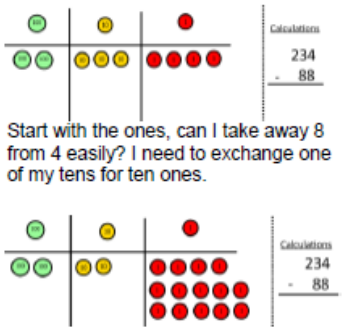
This will lead to a clear written column

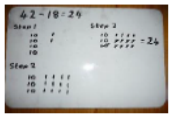
247
- 122
125</td>
</tr>
<tr>
<td colspan="2">Vocabulary
Take (away), leave, how many are left/left over? How many have gone? One less, two less… ten less…How many fewer is…than…? Difference between is the same as, Subtract, minus, how much less is? Half, halve, Equals, sign, One hundred less, Tens boundary, Subtraction, Hundreds boundary</td>
<td colspan="2">Key resources</td>
</tr>
</table>

Newquay Primary Academy Progression in Calculation - Subtraction

Year	Curriculum Statutory Requirements	Steps to success	Strategies

<table>
<tr>
<td>Year 4</td>
<td>By the end of the year, pupils should be taught to:

• Subtract with up to 4 digits using the formal written methods of columnar subtraction where appropriate
• Estimate and use inverse operations to check answers to a calculation
• Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.</td>
<td>Step 1
-I can subtract 3-digit numbers using columnar subtraction without bridging 10.
- I can solve simple subtraction problems.</td>
<td>346
– 120
226</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 2
-I can subtract 3-digit numbers using columnar methods.
- I can find fact families for subtraction facts.
- I am beginning to estimate the answer to a calculation.
- I can solve one-step problems in contexts, deciding which operations to use and why.</td>
<td> 

Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.
 
When confident, children can find their own way to record the exchange/regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 3
-I can subtract up to 4-digit numbers using columnar methods.
- I can use inverses in number problems (e.g. I think of a number and add 3).
- I can estimate the answer to a calculation and say whether my answer is likely.
- I can solve more complex one-step problems in contexts, deciding which operations to use and why.</td>
<td>Column subtraction
942—214
Expanded method
30 12
900 40 2
- 200 10 4
700 20 8

Compact Method
3 12
942
- 214
728</td>
</tr>
<tr>
<td colspan="3">Vocabulary
Take (away), leave, how many are left/left over? How many have gone?
One less, two less… ten less…How many fewer is…than…? Difference between is the same as, Subtract, minus, how much less is? Half, halve, Equals, sign, one hundred less, Tens boundary, Subtraction, Hundreds boundary, decrease, Inverse</td>
<td>Key resources</td>
</tr>
</table>

Newquay Primary Academy Progression in Calculation - Subtraction

Year	Curriculum Statutory Requirements	Steps to success	Strategies

<table>
<tr>
<td>Year 5</td>
<td rowspan="3">By the end of the year, pupils should be taught to:

• Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)

• Subtract numbers mentally with increasingly large numbers

• Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

• Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</td>
<td>Step 1
-I can add and subtract 3-digit numbers using columnar subtraction
- I can solve one-step problems in contexts, deciding which operations to use and why</td>
<td>Column subtraction
942—214
Expanded method
900 30 12 40 2
- 200 10 4
700 20 8

Compact Method
3 12
942
- 214
728</td>
</tr>
<tr>
<td></td>
<td>Step 2
- I can subtract 3-digit numbers using columnar subtraction
- I am beginning to use rounding to estimate the answer to a calculation
- I can solve more complex one-step problems in contexts, deciding which operations to use and why</td>
<td>NC – end of year 6 expected method (examples from NC)
874 – 523 becomes
8 7 4
– 5 2 3
3 5 1
Answer: 351

932 – 457 becomes
8 12 1
9 3 2
– 4 5 7
4 7 5
Answer: 475</td>
</tr>
<tr>
<td></td>
<td>Step 3
-I can add and subtract numbers up to 4 digits using columnar addition
- I can estimate the answer to a calculation using rounding and say whether my answer is likely
-I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why</td>
<td>5 12 1
2 6 3 . 0
- 2 6 . 5
2 3 6 . 5</td>
</tr>
<tr>
<td colspan="2">Vocabulary
Take (away), leave, how many are left/left over? How many have gone?
One less, two less… ten less…How many fewer is…than…? Difference between is the same as, Subtract, minus, how much less is? Half, halve, Equals, sign, one hundred less, Tens boundary, Subtraction, Hundreds boundary, decrease, Inverse</td>
<td colspan="2">Key resources</td>
</tr>
</table>

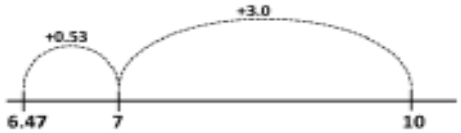
Newquay Primary Academy Progression in Calculation - Subtraction

Year	Curriculum Statutory Requirements	Steps to success	Strategies

<table>
<tr>
<td rowspan="3">Year 6</td>
<td rowspan="3">By the end of the year, pupils should be taught to:

• Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

• Solve problems involving subtraction

• Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</td>
<td>Step 1
-I can solve subtraction problems</td>
<td></td>
</tr>
<tr>
<td>Step 2
- I can subtract multiples of 10 and 100 to three and four digit numbers mentally
- I can use brackets in simple calculations
- I can solve more complex one step problems in context deciding which operations to use and why
- I can check whether my answer is likely</td>
<td>10 – 6.47 =
6(8-4)= 24
1. How will Maths Frog work out this subtraction?
2. Draft an empty number line jotting to show a hop from 6.47 to 6.5 then to 7 or one hop straight from 6.47 to 7. Then show a hop from 7 to 10.
 
</td>
</tr>
<tr>
<td>Step 3
-Subtract numbers mentally with increasingly large numbers
-I can use brackets and inverses effectively e.g. (24+P) x 6 = 150
- I can solve addition and subtraction two-step problems in context deciding which operations and methods to use and why
-I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</td>
<td>NC – end of year 6 expected method (examples from NC)
874 – 523 becomes
8 7 4
– 5 2 3
3 5 1
Answer: 351
932 – 457 becomes
8 12 1
9 3 2
– 4 5 7
4 7 5
Answer: 475</td>
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<tr>
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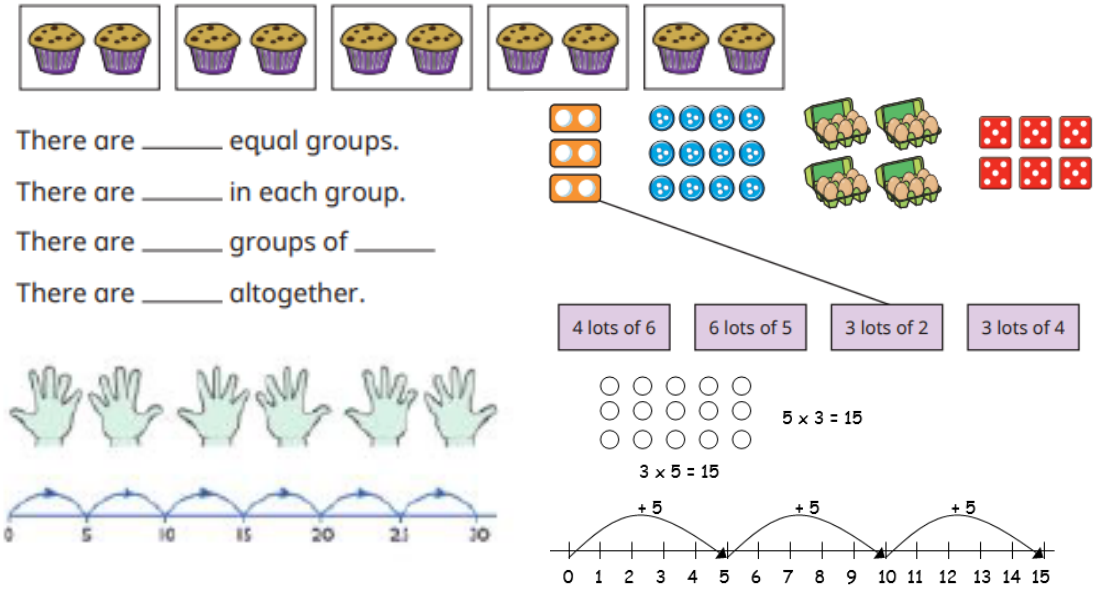
Take (away), leave, how many are left/left over? How many have gone?
One less, two less… ten less…How many fewer is…than…? Difference between is the same as, Subtract, minus, how much less is? Half, halve, Equals, sign, One hundred less, Tens boundary, Subtraction, Hundreds boundary, Decrease, Inverse, Units boundary, Tenths boundary</td>
<td>Key resources</td>
</tr>
</table>

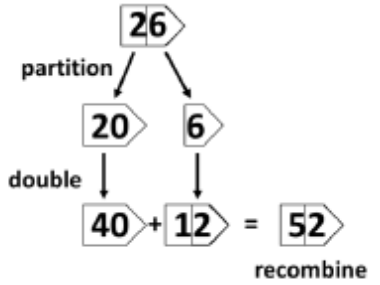
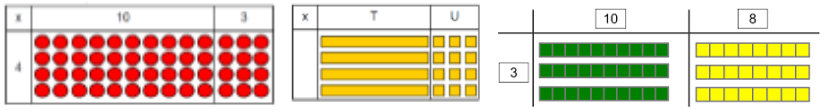
Newquay Primary Academy Progression in Calculation - Multiplication

Year	Curriculum Statutory Requirements	Strategies

Year 1	• **Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.**	
Year 2	• **Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers** • **Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs** • **Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot** • **Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.**	
Vocabulary		**Key resources**

Newquay Primary Academy Progression in Calculation - Multiplication

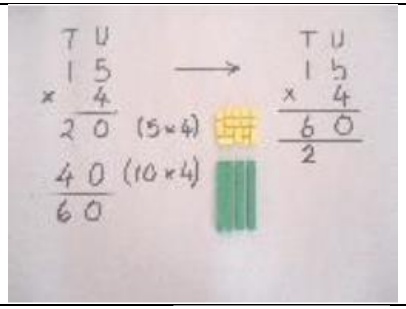
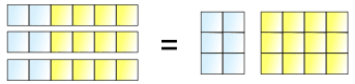
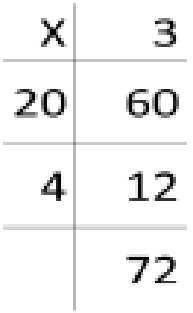
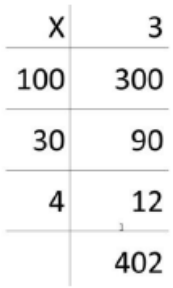
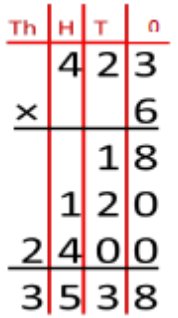
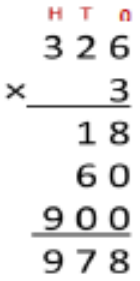
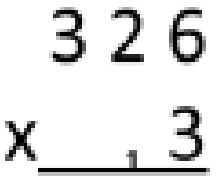
Year	Curriculum Statutory Requirements	Steps to success	Strategies

Year 3	**By the end of the year, pupils should be taught to:** • **Recall and use multiplication facts for the 3, 4 and 8 multiplication tables** • **Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods** • **Solve problems involving missing number problems involving multiplication including positive number scaling problems and correspondence problems where n objects are connected to m objects.**	**Step 1** - I can count in 2s and then double these facts to find multiples of 4. - I can relate times table facts to multiples of 10, e.g. 2x3=6 so 2x30=60; 6÷2=3 so 60÷2=30. - I can find a division fact from a multiplication fact.	 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15 
		Step 2 - I know my 5 x table and can count in 10s knowing that these are double 5x facts. - I can mentally calculate TU x U and TU ÷ U using my times table facts using jottings to support - I can find the associated number statements for a given number fact.	Grid method  X 3 20 60 4 12 72 × 30 5 7 210 35 210 + 35 = 245
		Step 3 - I can use my 2 and 4 times tables to find 8x - I know my 3 times tables - I can mentally calculate TU x U and TU ÷ U using my times table facts - I can use inverses in number problems E.g. I think of a number, double it and add 5. The answer is 35. What was my number?	Expanded Method 2 3 x 4 1 2 (4 x 3 = 12) + 8 0 (4 x 20 = 80) 9 2 T O 3 4 X 3 1 2 9 0 1 0 2

Vocabulary	**Key resources**
Lots of, groups of, x, times, multiplication, multiply, multiplied by, multiple of, product, once, twice, three times, four times, five times… ten times…, times as (big, long, wide and so on), repeated addition, array, row, column, double, halve, share, share equally, one each, two each, three each…, group in pairs, threes… tens equal groups of, ÷, divide, division, divided by, divided into, left, left over, remainder,product.	

Newquay Primary Academy Progression in Calculation - Multiplication

Year	**Curriculum Statutory Requirements**	**Steps to success**	**Strategies**

Year 4	**By the end of the year, pupils should be taught to:** • **Recall and use multiplication facts for multiplication tables up to 12 x 12** • **Use place value, known and derived facts to multiply mentally, including: x0 x1 and multiplying together three numbers** • **Recognise and use factor pairs and commutativity in mental calculations** • **Multiply two-digit and three-digit numbers by a one-digit number using formal written layout** • **Solve problems involving multiplying, including the distributive law to multiply two-digit numbers by one digit including positive number scaling problems and correspondence problems where n objects are connected to m objects.**	**Step 1** - I can recall multiplication and division facts for the 2, 5 and 10 x table. - I can multiply and divide using practical resources.	 
		Step 2 - I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table. - I can find factors for numbers to 20 (investigated using factor trees). - I can multiply and divide a two-digit number by a one-digit number using an informal method (e.g. number line). - I can multiply a whole number by 10.	  
		Step 3 - I can recall multiplication and division facts for the 7, 8 and 9 x table - I can use my multiplication tables knowledge to calculate with multiples of ten - I can find factors for numbers to 50 - I can multiply and divide a two-digit number by a one-digit number using a formal layout	 

Vocabulary	**Key resources**
Lots of, groups of, times, multiplication, multiply, multiplied by, multiple of, product,	

once, twice, three times, four times, five times… ten times, times as (big, long, wide, and so on), repeated addition, array, row, column, double, halve, share, share equally, one each, two each, three each…, group in pairs, threes… tens, equal groups of, divide, division, divided by, divided into, divisible by, remainder, factor, quotient inverse	

Newquay Primary Academy Progression in Calculation – Multiplication

<table>
<tr><th>Year</th><th>Curriculum Statutory Requirements</th><th>Steps to success</th><th>Strategies</th></tr>
<tr><td rowspan="3">Year 5</td><td rowspan="3">By the end of the year, pupils should be taught to:
• Identify multiples and factors: all factor pairs of a number, common factors of two numbers, establish whether a number up to 100 is prime and recall prime numbers up to 19.
• Multiply numbers up to four digits by a one or two-digit number using a formal written method.
• Multiply whole numbers and those involving decimals by 10, 100 and 1000.
• Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
• Solve problems involving multiplication, including using their knowledge of factors and multiples, squares and cubes</td><td>Step 1
- I can find factors for numbers to 20.
- I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table.
- I can solve one-step problems in contexts, deciding which operations to use and why.
Step 2
- I can find factors for numbers to 50.
- I can recall multiplication and division facts for the 7, 8 and 9 x table.
- I can solve more complex one-step problems in contexts, deciding which operations to use and why.</td><td><u>Variation ideas</u>
6 x 7 =
6 x 70 =
6 x 700 =
60 x 7 =
? = 600 x 7
0.6 x 7 =

326
x 3
978</td></tr>
<tr><td>Step 3
- I can recognise and use factor pairs and commutativity in mental calculations.
- I can recall multiplication and division facts up to 12x12.
- I can solve multiplication and division two-step problems in contexts, deciding which operations to use and why.
- I can solve problems involving multiplying and adding, including integer scaling problems.
- I can multiply numbers up to four digits by a one or two-digit number using a formal written method.</td><td>24
X 16
144 (2)
240
384</td></tr>
<tr><td colspan="2">Vocabulary
Lots of, groups of, times, multiplication, multiply, multiplied by, multiple of, product, once, twice, three times, four times, five times… ten times, times as (big, long, wide, and so on), repeated addition, array, row, column, double, halve, share, share equally, one each, two each, three each…, group in pairs, threes… tens, equal groups of, divide, division, divided by, divided into, divisible by, remainder, factor, quotient inverse, Divisible by, Factor, Quotient, Inverse</td><td colspan="2">Key resources</td></tr>
</table>

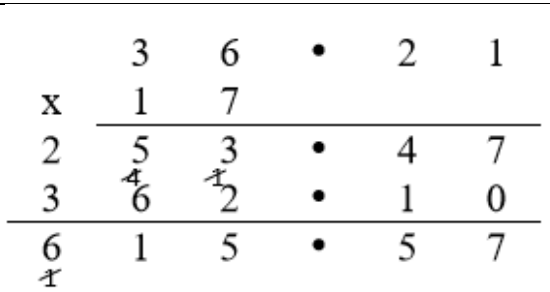
Newquay Primary Academy Progression in Calculation - Multiplication

<table>
<tr><th>Year</th><th>Curriculum Statutory Requirements</th><th>Steps to success</th><th>Strategies</th></tr>
<tr><td rowspan="3">Year 6</td><td rowspan="3">By the end of the year, pupils should be taught to:

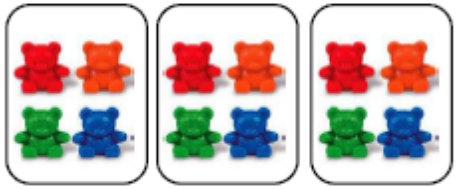
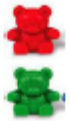
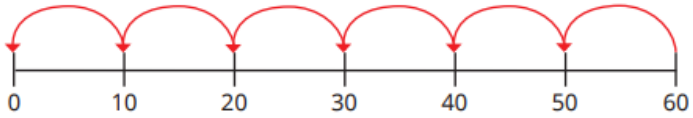
• Perform mental calculations, including with mixed operations and large numbers

• Identify multi-digit numbers up to 4 digits by a two-digit number using formal, long multiplication.

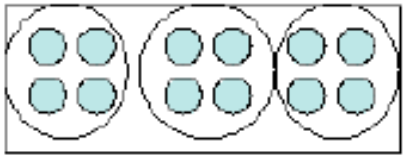
• Identify common factors, common multiples and common prime numbers.

• Use their knowledge of the order of operations to carry out calculations involving the four operations.</td><td>Step 1
- I can recall all times tables up to 12 x 12 and know related division facts.
- Recall and use multiplication and division facts up to 12 x 12.
- I can use knowledge of times tables and place value to multiply U.t by U e.g. 0.6 x 4 = 2.4.</td><td>NC – end of year 6 expected method (examples from NC)
Short multiplication
24 × 6 becomes
2 4
× 6
1 4 4
2
Answer: 144
342 × 7 becomes
3 4 2
× 7
2 3 9 4
2 1
Answer: 2394
2741 × 6 becomes
2 7 4 1
× 6
1 6 4 4 6
4 2
Answer: 16 446</td></tr>
<tr><td>Step 2
- I can I can multiply larger numbers (<10,000) by single-digit numbers using short multiplication.
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 1 and 0; dividing by 1; multiplying together three numbers.
- I know multiples, factors, square numbers prime numbers.
- I can use brackets in simple calculations.
- I can use knowledge of times tables and place value to multiply TU.t by U e.g. 0.06 x 4 = 0.24.
- I can check whether my answer is likely.</td><td>NC – end of year 6 expected method (examples from NC)
Long multiplication
24 × 16 becomes
2
2 4
× 1 6
2 4 0
1 4 4
3 8 4
Answer: 384
124 × 26 becomes
1 2
1 2 4
× 2 6
2 4 8 0
7 4 4
3 2 2 4
1 1
Answer: 3224
124 × 26 becomes
1 2
1 2 4
× 2 6
7 4 4
2 4 8 0
3 2 2 4
1 1
Answer: 3224</td></tr>
<tr><td>Step 3
- I can multiply decimals by a single-digit number using short multiplication.
- I can multiply and divide numbers mentally drawing on known facts.
- I can identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- I can use brackets and inverses effectively e.g. (24+P) x 6 = 150.
- Multiply one-digit numbers with one decimal place by whole numbers.
- I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</td><td>  </td></tr>
<tr><td colspan="2">Vocabulary
Lots of, groups of, times, multiplication, multiply, multiplied by, multiple of, product, once, twice, three times, four times, five times… ten times, times as (big, long, wide, and so on), repeated addition, array, row, column, double, halve, share, share equally, one each, two each, three each…, group in pairs, threes… tens, equal groups of, divide, division, divided by, divided into, divisible by, remainder, factor, quotient, inverse, Divisible by, Factor, Quotient, Inverse</td><td>Key resources</td></tr>
</table>

Newquay Primary Academy Progression in Calculation - Division

Year	Curriculum Statutory Requirements	Strategies
Year 1	• **Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.**	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15
Year 2	• **Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables** • **Recognising odd and even numbers** • **Calculate mathematical statements for division within the multiplication tables and write them using the signs ÷ and =** • **Show that multiplication of two numbers is commutative but division is not** • **Solve problems involving division using materials, arrays, repeated addition, mental methods and division facts, including problems in contexts.**	14 ÷ 3 = Divide objects between groups and see how much is left over   40 pencils are shared equally between 5 children.  How many pencils does each child get?  0 10 20 30 40 50 60 60 ÷ 10 = _____
Vocabulary +, add, more, plus, make, sum, total, altogether, double, near double, one more, two more… ten more, how many more to make…? how many more is… than…? how much more is…?		**Key resources**

Newquay Primary Academy Progression in Calculation - Division

Year	Curriculum Statutory Requirements	Steps to success	Strategies
Year 3	**By the end of the year, pupils should be taught to:** • **Recall and use multiplication and division facts for the 3, 4, 8x tables.** • **Write and calculate mathematical statements for division using the multiplication tables they know, including 2-digit divided by 1-digit using mental and progressing to formal written methods** • **Solve problems, involving missing number problems, division, including positive number scaling problems and correspondence problems where n objects are connected to m objects.**	**Step 1** - I know my 2, 5 and 10 times tables and related division facts and use these to solve problems. - I can find half of a given number using partitioning. - I can relate multiplication/ division facts to multiples of 10, e.g. 2x3=6 so 2x30=60; 6÷2=3 so 60÷2=30 - I can find a division fact from a multiplication fact	
		Step 2 - I can count in 3, 4 and 8 ∗ I can mentally calculate TU ÷ U using my times table facts using jottings to support and using my knowledge of 10x to support me.	20 ÷ 5 = ? 5 x ? = 20
		Step 3 - I know my 3, 4, 8 and 9 times tables and related division facts. - I can mentally calculate TU ÷ U using my times table facts - I can use inverses in number problems e.g. I think of a number, double it and add 5. The answer is 35. What was my number? - Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

Vocabulary	Key resources
Remainder, divisor, factor	

Newquay Primary Academy Progression in Calculation - Division

<table>
<tr><th>Year</th><th>Curriculum Statutory Requirements</th><th>Steps to success</th><th>Strategies</th></tr>
<tr>
<td>Year 4</td>
<td>By the end of the year, pupils should be taught to:

• Recall multiplication and division facts up to 12 x 12.

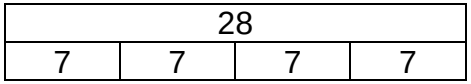
• Use place value, known and derived facts to divide mentally, including dividing by 1.

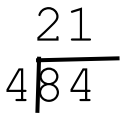
• Solve problems involving dividing a three-digit number by one-digit and number using a formal layout.</td>
<td>Step 1
- I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table
- I can use place value to divide by 1 and 10.
- I can divide a two-digit number by a one digit number using an informal method

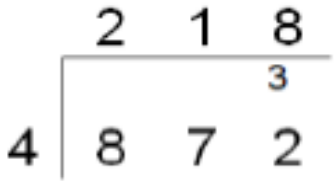
Step 2
- I can recall multiplication and division facts for the 7, 8 and 9 x table
- I can find factors for numbers to 20
- I can divide two- and three-digit numbers by one-digit number using a formal layout

Step 3
- I can recall multiplication and division facts for multiplication tables up to 12 x 12
- I can find factors for numbers to 50
- I can divide a three-digit number by a one-digit number using a formal layout (short division)
- I can divide a whole number by 10 and 100 with a whole number answer, explaining what is happening and why</td>
<td>Find the inverse of multiplication and division sentences by creating four linking number sentences.

7 x 4 = 28
4 x 7 = 28
28 ÷ 7 = 4
28 ÷ 4 = 7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</tr>
<tr>
<td colspan="2">Vocabulary
divisible, divisible by, factor, factor quotient, inverse, fact boxes, divisor</td>
<td colspan="2">Key resources</td>
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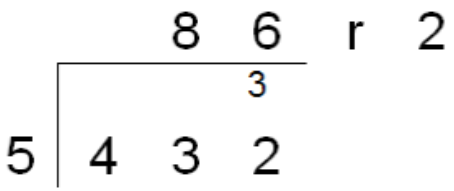
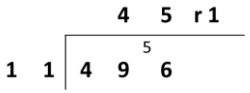
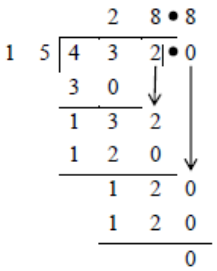
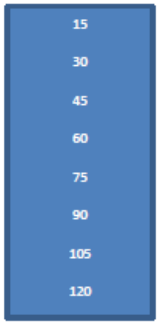
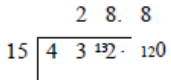
Newquay Primary Academy Progression in Calculation - Division

Year	Curriculum Statutory Requirements	Steps to success	Strategies
Year 5	**By the end of the year, pupils should be taught to:** • **Identify multiples and factors, including:** - finding all factor pairs of a number - common factors of two numbers - know and use the vocabulary of prime numbers and establish whether a number up to 100 is prime • **Multiply and divide numbers mentally drawing on known facts** • **Divide numbers up to 4 digits by a one-digit number using a written method and interpret remainders appropriately for the context** • **Divide whole numbers and those involving decimals by 10, 100 and 1000**. • **Solve problems involving division, including using their knowledge of factors and multiples, squares and cubes**	**Step 1** - I can find factors for numbers to 20 - I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table - I can divide a two-digit number by a one-digit number using short division - I can solve one-step problems in contexts, deciding which operations to use and why **Step 2** - I can find factors for numbers to 50 - I can recall multiplication and division facts for the 7, 8 and 9 x table - I can divide a two-digit number by a one-digit number using short division - I can solve more complex one-step problems in contexts, deciding which operations to use and why **Step 3** - I can recognise and use factor pairs and commutativity in mental calculations - I can recall multiplication and division facts up to 12x12 - I can divide a three-digit number by a one-digit number using short division - I can solve multiplication and division twostep problems in contexts, deciding which operations to use and why - I can solve problems involving multiplying and adding, including integer scaling problems	98 ÷ 7 becomes **1 4** 2 **7 | 9 8** Answer: 14 872 ÷ 4 becomes 2 1 8 3 4 | 8 7 2 Divide numbers up to 4 digits by a one-digit number using a written method and interpret remainders appropriately for the context. 8 6 r 2 3 5 | 4 3 2

Vocabulary	Key resources

Newquay Primary Academy Progression in Calculation - Division

Year	Curriculum Statutory Requirements	Steps to success	Strategies
Year 6	**By the end of the year, pupils should be taught to:** • **Perform mental calculations, including with mixed operations and large numbers** • **Divide numbers up to 4 digits by a two-digit number using the formal written method of long division** • **Interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context.** • **Divide numbers up to 4 digits by a two-digit number using the formal written method of short division as appropriate.**	**Step 1** - I can recall all times tables up to 12 x 12 and know related division facts. - I can recall and use x and ÷ facts up to 12 x 12 - I can use knowledge of times tables and place value to divide - I can divide HTU by U where there is a remainder. **Step 2** - I can recall all ÷ facts related to times tables up to 12 x 12 - I can use place value, known and derived facts to divide mentally, including dividing by 1 - I know multiples, factors and prime numbers - I can use brackets in simple calculations - I can use knowledge of times tables and place value to divide e.g. 480 ÷ 4 = 120 so 48 ÷ 4 = 12 - I can check whether my answer is likely - I divide HTU by TU where the remainder is recorded as a fraction. **Step 3** - I can divide a two-digit number by 2,3,4,5, and 10 with whole number answers and remainders - I can divide numbers mentally drawing on known facts to maintain fluency. - I can identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers - I can use brackets and inverses effectively e.g. (24+P) x 6 = 150 - I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy - I can explore the order of operations using brackets - I divide HTU by T U where the remainder is recorded as a decimal.	 496 ÷ 11 becomes  Answer: $45\frac{1}{11}$ Progressing to long division to find a decimal remainder:   **Simplify this method** 

Vocabulary	Key resources