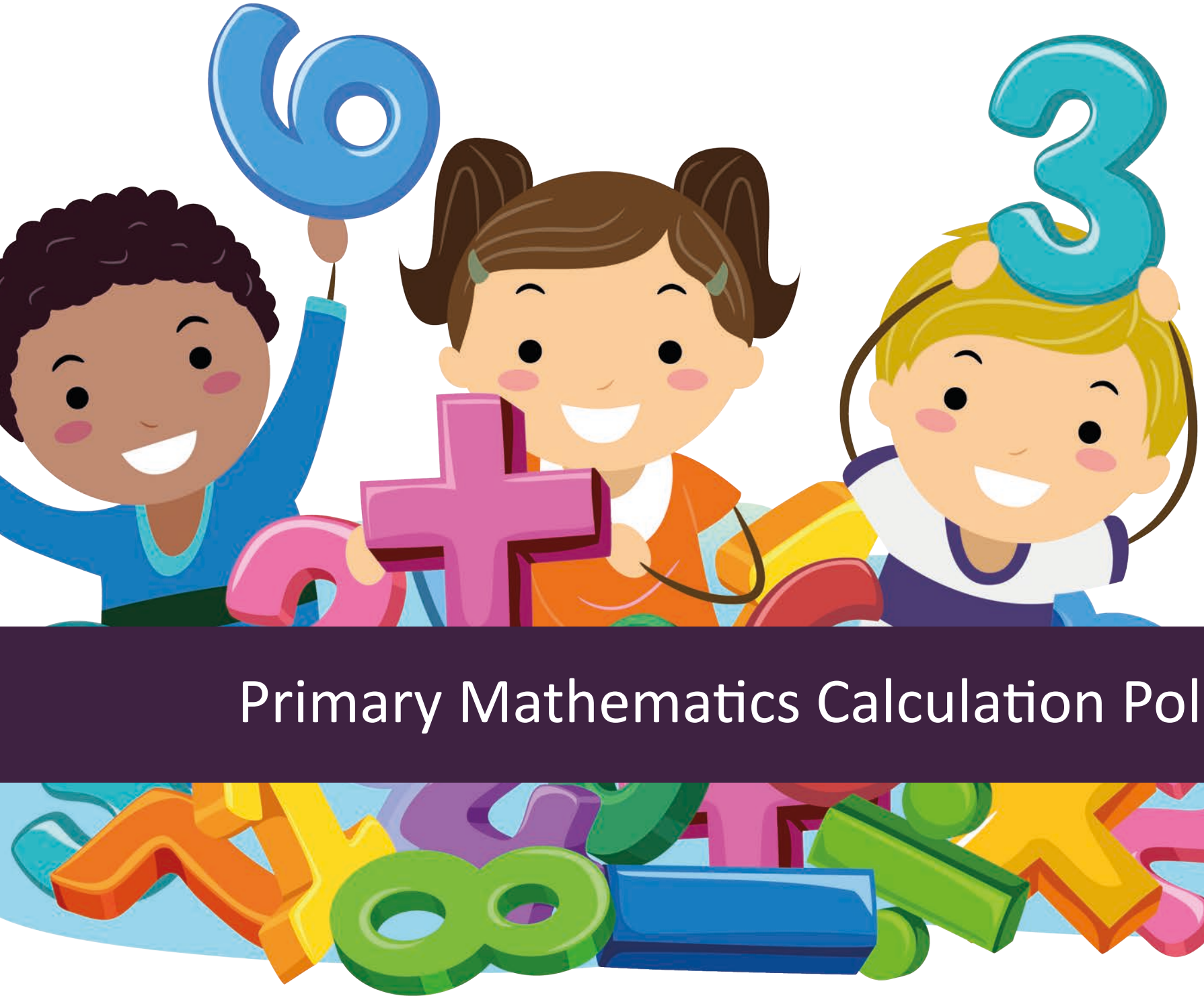


RSA
Central RSA
Academies Trust

Primary Mathematics Calculation Policy

Aims of Central RSA Academy Trust
Primary Calculation Policy

The following calculation policy has been designed to meet all National Statutory Requirements for mathematics and these can be found at the start of each Year group sections. All statutory requirements must be fulfilled for each year group.

The policy is organised according to age stage expectations with examples (though not exhaustive) of how to support learning and the steps through a concept. Following the policy will ensure that learning is progressive from Year 1 to 6 and builds on learning from previous knowledge and skills learnt.

There is an emphasis on models and images in the policy and an expectation that the process of using concrete and pictorial models and images as a method of teaching concepts will be prioritised for the vast majority of children, before introducing the concept in an abstract form.

It is vital that children are taught according to where they are currently working at and are showing to have “mastered” a concept before moving onto the next one. Children who are demonstrating that they are secure in a skill should be challenged to the next one as necessary.

Children must be encouraged to ask themselves key questions before opting for a written method:

Can I do it in my head? (use mental strategy)

Could I use some jottings to help me?

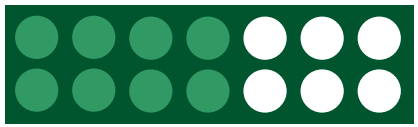
Should I use a formal method to work this out?

Published October 2020

Addition and Subtraction – **Year 1**

Year 1 statutory requirements:

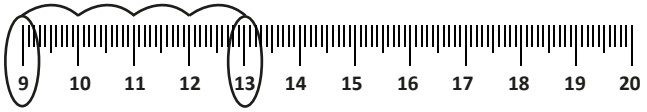
- Count to and across 100, forwards beginning with 0 or 1, or from a given number
- A given number, identify one more
- Read, write and interpret mathematical statements involving addition (+) and subtraction (-) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20
- Add one-digit and two-digit numbers to 20, including 0
- Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems
- Read and write numbers from 1 – 20 in numerals and words

Addition Key concepts	Examples	Key vocabulary
Identify and represent numbers using objects and multiple pictorial representations		+ = Add, part, whole, addition, count on, total, number bond, calculation, operation, make, and, more, altogether, digit.
Memorise and reason with number bonds to 10 and 20 in several forms	 **8+6=14** **6+8=14** **14-8=6** **14-6=8**	
Count on in ones to and across 100 and find one more than a given number	**96+6=102**	
Use concrete resources and a number line to support the addition of numbers. Know and use strategy of finding the larger number, and counting on in ones from this number	**2 digits + 1 digit** **18+5=23**	
Begin to use the + and = signs to write calculations in a number sentence	**Missing numbers need to be in different places.** **2 + ■ = 8 ■ + 2 = 8 2 + 6 = ■**	
Solve relevant one-step problems using concrete objects and pictorial representatives	**Mr McGregor picks 4 carrots and Peter Rabbit picks 2. How many carrots have they picked all together?** 	

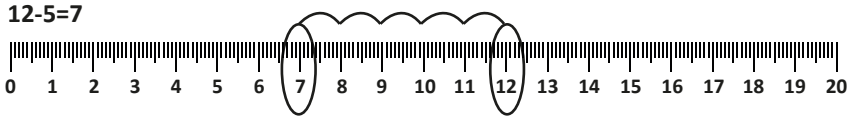
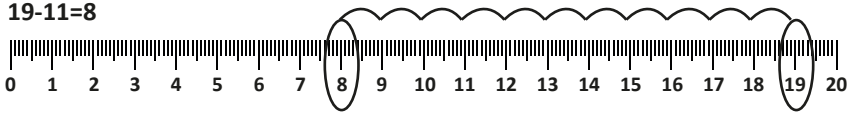
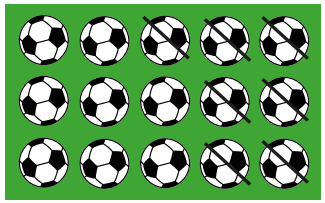
Addition and Subtraction – **Year 1**

Year 1 statutory requirements:

- Say which number is one less than a given number
- Represent and use number bonds and related subtraction facts within 20
- Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- Subtract one digit and two-digit numbers to 20 including 0
- Solve one step problems that involve subtraction using concrete objects and pictorial representations and missing number problems

Subtraction Key concepts	Examples	Key vocabulary
Understand subtraction as take away. Use practical resources, pictorial representations, role play, stories and rhymes		- = Subtract, subtraction, minus, takeaway, parts, whole, count back, difference, less.
Use number bonds and subtraction facts within 20	**16 - ■ = 10 ■ - 8 = 12 18 - 9 = ■**	
Count back in ones and find one less than a given number	 **13-4=9**	
Counting on should only be used when finding the difference	**The difference between 7 and 10 = 3** **The difference between 7 and 11 = 4**	

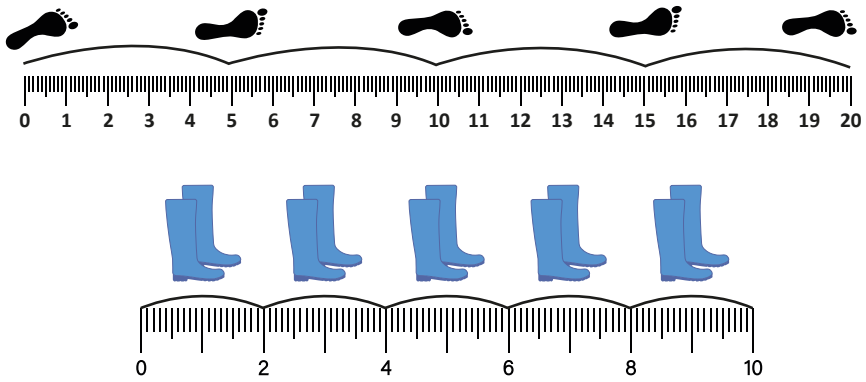
Addition and Subtraction – **Year 1**

Subtraction Key concepts	Examples	Key vocabulary
Know and use strategy of counting back to subtract one and two digit numbers	**12-5=7**  **19-11=8**  	Subtract, subtraction, minus, takeaway, parts, whole, count back, difference, less.
Begin to use the – and = signs to write calculations in a number sentence	**e.g. 19-7=12**	
Solve relevant one-step problems using concrete objects and pictorial representatives	**Missing numbers need to be in different places.** **12 - ■ = 4** **■ - 8 = 4** **James has 15 football stickers. He gives 7 to Ahmed. How many stickers does he have left?**  **15-7=8**	

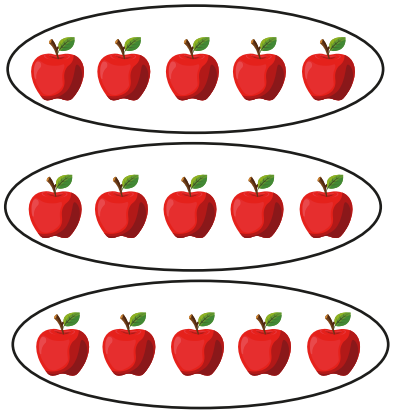
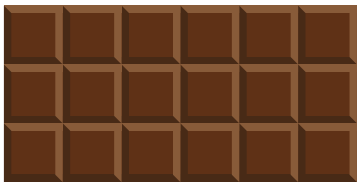
Multiplication and Division – **Year 1**

Year 1 statutory requirements:

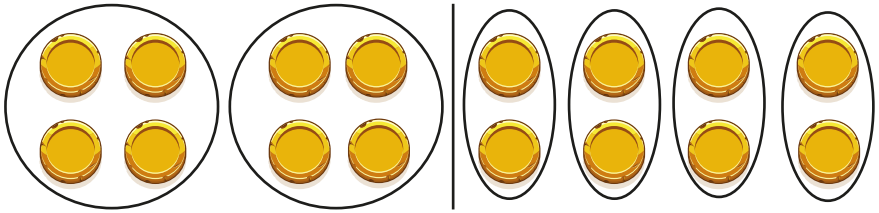
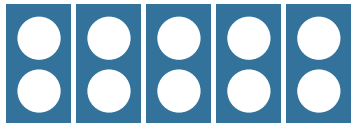
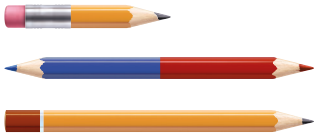
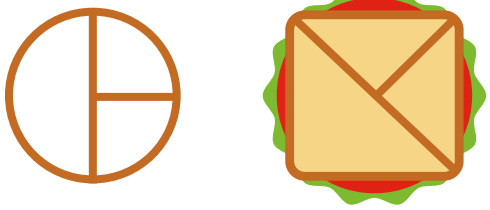
- Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher
- Recognise, find and name half as one of two equal parts of an object, shape or quantity
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

Multiplication Key concepts	Examples	Key vocabulary
Count in twos, fives and tens using practical resources, role play, stories and songs		Equal, equal groups, repeated addition, array, double, equal rows, equal columns, lots of, once, twice, three, four, five times.
Understand multiplication as repeated addition – use concrete objects to support understanding	**5+5+5 or 3x5** **(3 groups of 5)**	

Multiplication and Division – **Year 1**

Multiplication Key concepts	Examples	Key vocabulary
Use pictorial representations	**3x5 is 3 groups of 5** 	Equal, equal groups, repeated addition, array, double, equal rows, equal columns, lots of, once, twice, three, four, five times.
Use arrays	**6** **3**  **18 squares of chocolate**	
Use the sign x and understand it as lots of/ groups of	 **4x2=8**	

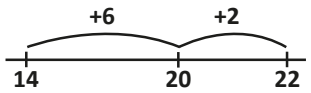
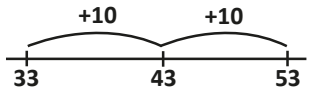
Multiplication and Division – **Year 1**

Division Key concepts	Examples	Key vocabulary
Understand division as sharing using concrete resources		Equal groups, sharing equally, fraction, half, halve, quarter, into groups of, into lots of.
Begin to understand division as grouping using concrete resources	 **12 into groups of 2**	
Use the division sign and understand it as sharing between or sharing into groups	**12÷2** **12÷3**	
Recognise and find half a length, quantity, set of objects or shape		
Combine halves and quarters as parts of a whole		

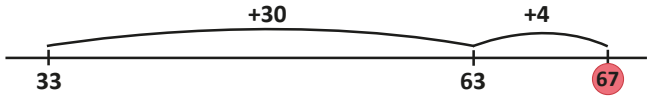
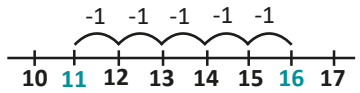
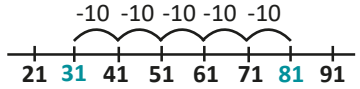
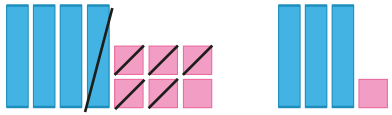
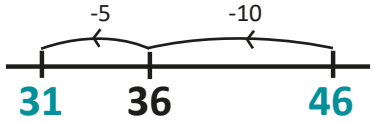
Addition and Subtraction – **Year 2**

Year 2 statutory requirements:

- Recognise the place value of each digit in a 2 digit number (10s and ones)
- Identify, represent and estimate numbers using different representations including a number line
- Compare and order numbers from 0 to 100 more than, less than and = signs
- Read and write numbers to at least 100 in numerals and words
- Solve problems with addition and subtraction using concrete objects and pictorial representations including those involving numbers, quantities and measures – apply their increasing knowledge of mental and written methods
- Recall and use addition and subtraction facts to 20 fluently, derive and use related facts up to 100
- Add and subtract numbers using concrete numbers, pictorial representations and mentally – encourage the use of efficient methods
- Show that addition of numbers can be done in any order (commutative) and subtraction cannot
- Recognise and use inverse relationship between addition and subtraction to check calculations and solve missing number problems

Addition Key concepts	Examples	Key vocabulary
Partition 2-digit numbers using a variety of models and images		Commutative, commutative law, increase, inverse, estimate, greater than sign (>), less than sign (<), value.
Memorise and reason with number facts to 20 in several forms		
Add 2-digit number and ones	**14+8=22** 	
Add 2-digit number and tens	**33+20** 10+10 	
Add two 2-digit numbers	**55 + 44** 50 5 40 4 + **= 99**	
Add three 1-digit numbers	**9+7+6=22** 	

Addition and Subtraction – **Year 2**

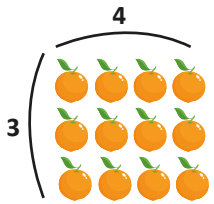
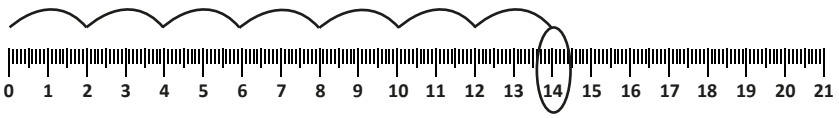
Subtraction Key concepts	Examples	Key vocabulary
Use a numbered number line and progress onto an empty number line where they combine the jumps		Decrease, inverse.
Subtract 2 digit and ones	**16-5=11** 	
Subtract 2 digit and tens	**81-50=31** 	
Subtract 2 digit numbers using concrete resources, then on a number line and then on an empty number line	**46-15=31** 10 5  **46-15 = 31** **or** 	

(Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers).

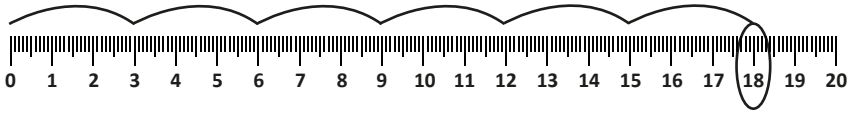
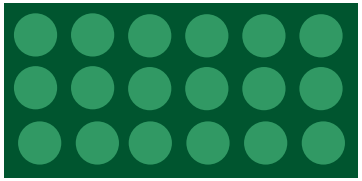
Multiplication and Division – **Year 2**

Year 2 statutory requirements:

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables including recognising odd and even numbers
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using x, ÷ and = signs
- Show that multiplication of two numbers can be done in any order (commutative) and division cannot
- Solve problems involving multiplication and division using objects, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts
- Recognise, find, name and write ⅓, ¼, ¾, ¾ of a length, shape, set of objects or quantity
- Write simple fractions e.g half of 6 equals 3 and recognise the equivalence of ¾ and a ½

Multiplication Key concepts	Examples	Key vocabulary
Further develop understanding of multiplication as repeated addition	**4+4+4 or 3x4**	Multiplication, multiply, commutative, inverse, multiples.
Use pictorial representations	**3x4 3 groups of 4**	
Use arrays	 **4** **3** **Commutative law 3x4 or 4x3**	
Model and bridge link from repeated addition to solve multiplication problems using a number line	**7 groups of 2 = 14** **7 jumps of 2** **7x2=14**  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	

Multiplication and Division – **Year 2**

Division Key concepts	Examples	Key vocabulary
Further develop the understanding of the difference between sharing and grouping using concrete resources	**18 smiley faces shared between 3 classes**	Divide, division, divided by, odd, even, third, equivalent.
Use numbered number lines to divide using grouping	**18 into groups of 3 = 6 groups** **18 into jumps of 3 = 6 jumps** **18÷3=6** 	
Reinforce division through the use of arrays	 **18÷3=6** **18÷6=3**	

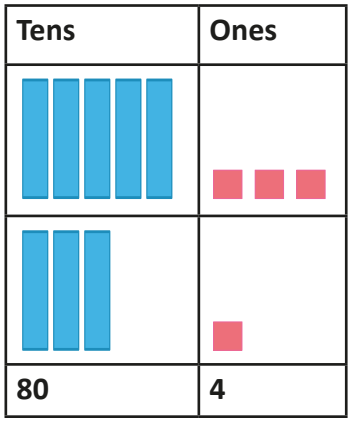
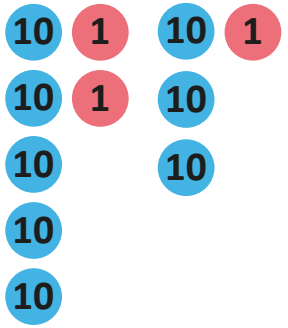
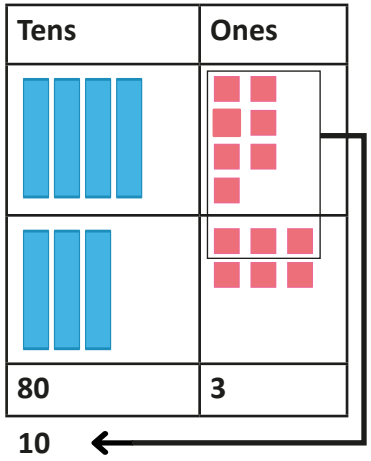
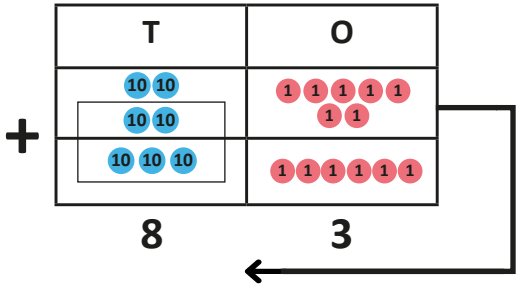
Remember to develop connections between fractions and division and rephrase this calculation as ⅓ of 18 is the same as 18÷3=6

Addition and Subtraction – **Year 3**

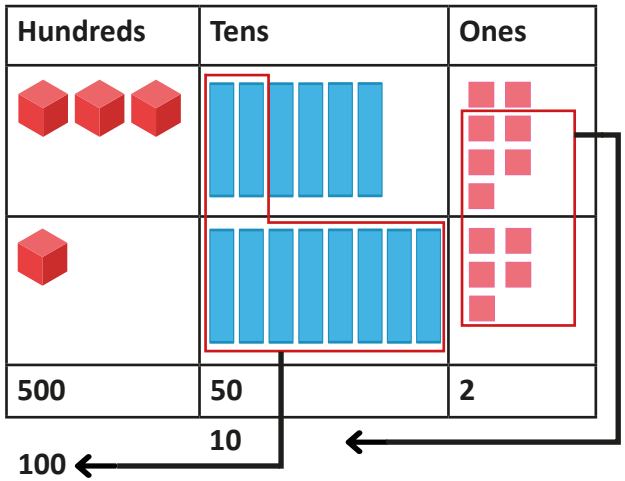
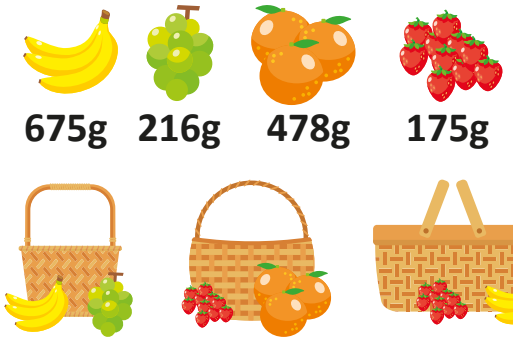
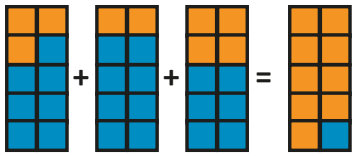
Year 3 statutory requirements:

- Count in groups of 50 and 100 and 10 or 100 more or less than a given number
- Recognise the place value for 3-digit numbers – hundreds, tens and ones
- Compare, order, read and write numbers to 1000 in numerals and words
- Identify, represent and estimate numbers using different representations
- Add and subtract numbers mentally
- Add and subtract numbers up to 3-digits using formal written methods of columnar for addition and subtraction
- Estimate an answer to a calculation and use inverse to check
- Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction
- Add and subtract numbers using concrete and pictorial representations, as well as mentally – encourage the use of efficient methods
- Show that addition of numbers can be done in any order (commutative) and subtraction cannot
- Recognise and use inverse relationship between addition and subtraction to check calculations and solve missing number problems

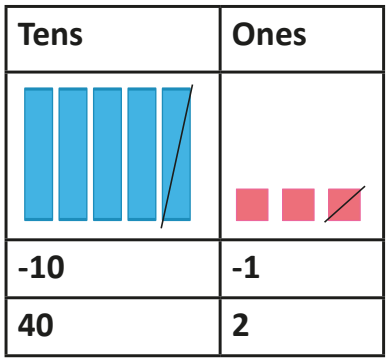
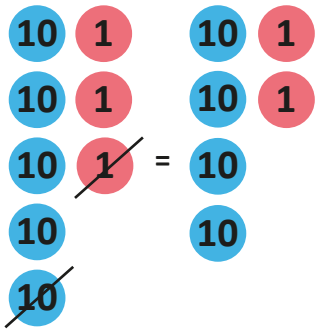
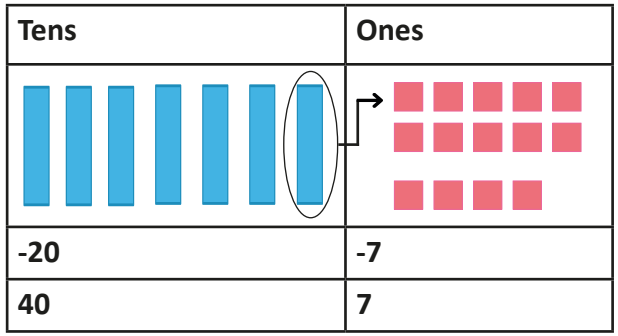
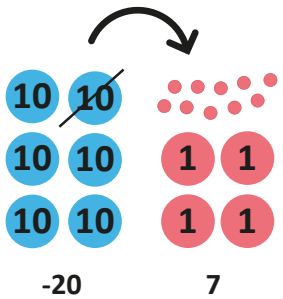
Addition and Subtraction – **Year 3**

Addition Key concepts	Examples	Key vocabulary
Use column method with place value resources to support the conceptual understanding of adding numbers up to 3 digits	53+31=84  or  	Sum, sum of, carry, place value columns, numeral/s.
Progress to adding a 3 digit number with another 3 digit number using the same strategy as the example for two digits	**47+36=83**  or  47 + 36 83 1	

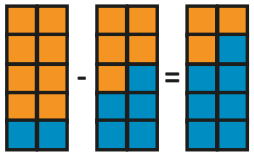
Addition and Subtraction – **Year 3**

Addition Key concepts	Examples	Key vocabulary
Adding 3 digit numbers using a written method. Carried digits should be placed at the bottom of the column in which it is to be added, but needs to be smaller in size	 367 + 185 552 1 1	Sum, sum of, carry, place value columns, numeral/s.
Solve number problems and practical problems including missing numbers in a range of contexts	 **What is the weight of food in each basket?** **Choose 3 of the items for your basket. How heavy would it be?**	
Add fractions with the same denominator within one whole	 $\frac{3}{10} + \frac{2}{10} + \frac{4}{10} = \frac{9}{10}$	

Addition and Subtraction – **Year 3**

Subtraction Key concepts	Examples	Key vocabulary
Use column method with place value resources to support the conceptual understanding of subtracting numbers up to 3 digits	**53-11=42**  or  	More than, fewer than, exchange, compact method.
Progress to using the column method, with place value resources to support the conceptual understanding of subtracting numbers with up to 3 digits *with exchanging 10s and/or 100s*	**74-27=47**  In this example to subtract 7 ones from 4 ones we need to **exchange** a ten for ten ones. We now can subtract 7 ones from 14 ones. or  	

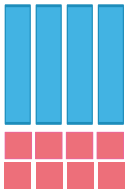
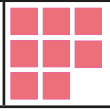
Addition and Subtraction – **Year 3**

Subtraction Key concepts	Examples	Key vocabulary
Subtract up to 3 digit numbers using a written method Exchanged 10 or 100 should be placed at the top of the column in which it has been adjusted	$\begin{array}{r} {}^{6}\cancel{7}^{1}4 \\ -\ 27 \\ \hline 47 \end{array}$ $\begin{array}{r} {}^{4}\cancel{5}^{1}37 \\ -\ 254 \\ \hline 283 \end{array}$	More than, fewer than, exchange, compact method.
Solve number problems and practical problems including missing numbers in a range of contexts	$\begin{array}{r} \square 1 \\ -\ 1\square \\ \hline 63 \end{array}$ John has a collection of 263 football cards. His brother has 189. How many more football cards does John have?	
Subtract fractions with the same denominator within one whole	 $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$	

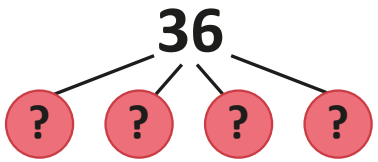
Multiplication and Division – **Year 3**

Year 3 statutory requirements:

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the tables that they know, including for 2 digit numbers x 1 digit numbers using mental and progressing to formal written methods
- Solve problems including missing number problems, including multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects
- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and dividing numbers and quantities by 10
- Recognise, find and write fractions of a discrete set of objects: unit fractions (⅒) and non-unit (⅗) fractions with small denominator fractions
- Recognise and use fractions as numbers: unit fractions (⅒) and non-unit (⅗) fractions with small denominator fractions
- Recognise and show, using diagrams, equivalent fractions with small denominators
- Compare and order unit fractions and fractions with the same denominator
- Solve fraction problems

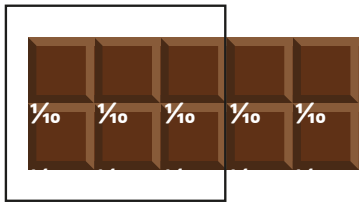
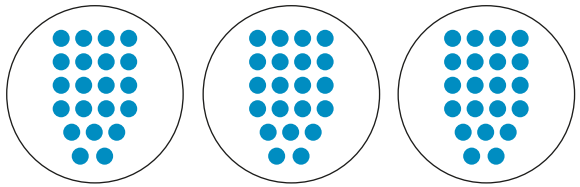
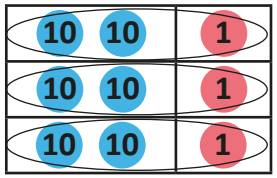
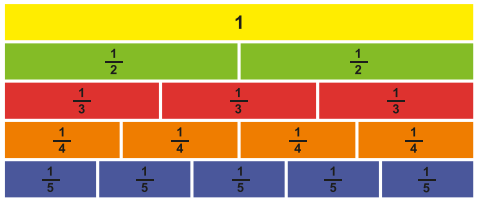
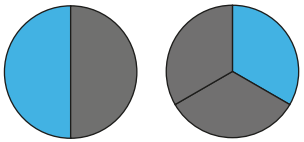
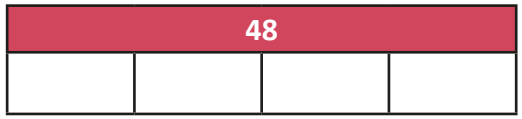
<table>
<tr><th>Multiplication Key concepts</th><th>Examples</th><th>Key vocabulary</th></tr>
<tr><td>Develop recall of multiplication facts alongside the corresponding inverse division facts</td><td>
<table>
<tr><td>x</td><td>3</td><td>4</td><td>8</td></tr>
<tr><td>5</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td></td><td></td><td></td></tr>
</table>
<table>
<tr><td>x</td><td>4</td><td>?</td><td>?</td></tr>
<tr><td>?</td><td>8</td><td>6</td><td>10</td></tr>
<tr><td>6</td><td>24</td><td>18</td><td>30</td></tr>
<tr><td>?</td><td>32</td><td>24</td><td>40</td></tr>
</table>
12x4=48
 
4x10=40
4x2=8
40+8=48
</td><td rowspan="3">Product, grid method, short multiplication, factor.</td></tr>
<tr><td>Use concrete resources to develop conceptual understanding of the compact method</td><td>
<table>
<tr><td>x</td><td>10</td><td>2</td></tr>
<tr><td>4</td><td> </td><td>  </td></tr>
</table>
or
<table>
<tr><td>x</td><td>10</td><td>2</td></tr>
<tr><td>4</td><td>40</td><td>8</td></tr>
</table>
</td></tr>
<tr><td>Use known facts to help work out the unknown ones</td><td>2x6=12 so 2x60=120
(understanding this is 10x bigger)</td></tr>
</table>

Multiplication and Division – **Year 3**

<table>
<tr><th>Division Key concepts</th><th>Examples</th><th>Key vocabulary</th></tr>
<tr><td>Understand the value of each digit within a written method</td><td>Part whole: division
 

36÷4=?
36÷4=9 (9x4=36)</td><td rowspan="4">Factor, denominator, numerator, equivalent, unit fraction, non-unit fractions, multiple, diagram, compare, order.</td></tr>
<tr><td>Introduce ‘using concrete methods’</td><td>84÷4=21
<table><tr><th>T</th><th>O</th></tr><tr><td>10 10</td><td>1</td></tr><tr><td>10 10</td><td>1</td></tr><tr><td>10 10</td><td>1</td></tr><tr><td>10 10</td><td>1</td></tr></table></td></tr>
<tr><td>Use written method of short division where each digit is a multiple of the divisor (no remainders and no carrying)</td><td>3 2
3) 9 6
Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).
→
1 8
4) 7 3 2
Limit numbers to NO remainders in the final answer, but with remainders occurring within the calculation.
Remember to develop connections between fractions and division and rephrase these calculations as ⅓ of 96 and ¼ of 72.</td></tr>
<tr><td>Solve contextual one step problems using fractions</td><td>The local shop normally sells Mars bars for 40p. The shop is having a ¼ off sale. How much money do you save if you buy a Mars bar?
40÷4=10
<table><tr><th>T</th><th>O</th></tr><tr><td>10</td><td></td></tr><tr><td>10</td><td></td></tr><tr><td>10</td><td></td></tr><tr><td>10</td><td></td></tr></table>¼ =10
A saving of 10p</td></tr>
</table>

Multiplication and Division – **Year 3**

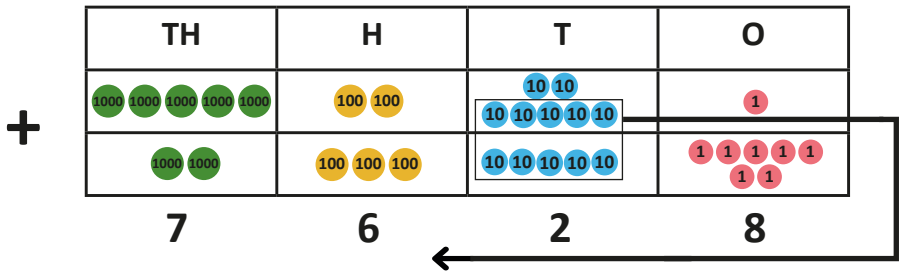
Division Key concepts	Examples	Key vocabulary
Divide an object into tenths and divide one-digit numbers by 10	 <table><tr><th>Ones</th><th>Tenths</th></tr><tr><td></td><td>6</td></tr></table> **6÷10= 6/10**	Factor, denominator, numerator, equivalent, unit fraction, non-unit fractions, multiple, diagram, compare, order.
Write fractions of a set of objects	**⅓ of 63**   **⅓ of 63 = 21**	
Recognise and show equivalent fractions		
Compare and order unit fractions or same denominator	 **What is bigger? ½ or ⅓?** We can see that ½ is bigger. When the top numbers (numerators) are the same, the smaller the denominator (bottom number), the bigger the fraction.	
Solve contextual one step problems using fractions	**If Julie has 48 cookies and eats ¼, how many cookies did she eat?** $4\overline{)48}$ 	

Addition and Subtraction – **Year 4**

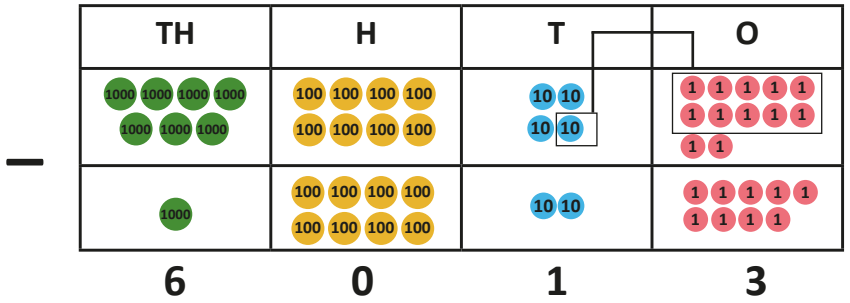
Year 4 statutory requirements:

- Count in multiples of 25 and 1000
- Find 1000 more or less than a given number
- Count backwards across zero into negative numbers
- Know place value for 4-digit numbers
- Order and compare numbers beyond 1000
- Identify, represent and estimate numbers
- Round to the nearest 10, 100 and 1000
- Solving number and practical problems using increasingly larger positive numbers
- Adding and subtracting numbers using formal written methods
- Estimate and use inverse operations to check answers
- Solve addition and subtraction 2-step problems in context, deciding which operations to use and why
- Add and subtract fractions with the same denominator
- Estimate an answer to a calculation and use inverse to check
- Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction
- Add and subtract numbers using concrete numbers, pictorial representations and mentally – encourage the use of efficient methods
- Show that addition of numbers can be done in any order (commutative) and subtraction cannot
- Recognise and use inverse relationship between addition and subtraction to check calculations and solve missing number problems

Addition and Subtraction – **Year 4**

Addition Key concepts	Examples	Key vocabulary
(Build on learning from year 3) Represent and write compact column addition up to 4 digits – carrying is small and at the bottom of the column in which it is to be added	**5271 + 2357**  $\begin{array}{r} 5271 \\ +\ 2357 \\ \hline 7628 \\ \hline 1 \end{array}$	Use of previously learnt vocabulary.
Solve contextual 2 step problems involving addition and subtraction	**At a recent clean up of the playground, 3 children collected 196 pieces of rubbish. Alex collected 64 pieces, Dan collected 73 pieces. How many has Joe collected?** **Poppy has 523 comics. She lends 246 to Kaitlyn and 156 to Naomi. How many does she have left?**	
Add fractions with the same denominator	**Add ⅕ and ⅖** 	

Addition and Subtraction – **Year 4**

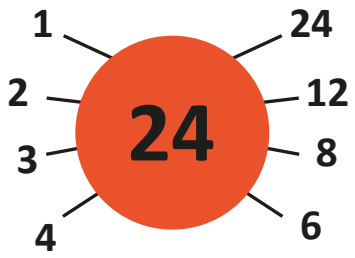
Subtraction Key concepts	Examples	Key vocabulary
(Build on learning from year 3) Represent and write compact column subtraction up to 4 digits with exchanging	**7842 - 1829**  $\begin{array}{r} {}^{3}\not{7}\,{}^{1}\not{8}\not{4}2 \\ -\ 1829 \\ \hline 6013 \end{array}$	Use of previously learnt vocabulary.
Represent and write compact column subtraction when you cannot exchange from the next column e.g. tens to ones	$\begin{array}{r} {}^{3}\not{2}\,{}^{1}9{}^{1}\not{0}3 \\ -\ 1344 \\ \hline 1059 \end{array}$ **The exchange 10 or 100 is just as important as any other number, therefore, it should be written clearly and placed at the top of the column that has been adjusted.**	
Subtract fractions with the same denominator	$\frac{17}{5} - \frac{1}{5} = \frac{17-1}{5} = \frac{16}{5} = (3\frac{1}{5})$ $\frac{17}{5} - \frac{1}{5} - \frac{3}{5}$ **Subtract the numerator and place the difference over the common denominator, 5.** $\frac{17}{5} = \frac{17-1-3}{5} = \frac{13}{5} = (2\frac{3}{5})$ **Summary: To subtract 2 or more fractions that have the same denominators, subtract the numerators and place the resulting difference over the common denominator.**	
Solve contextual 2 step problems involving addition and subtraction	**Peter and Archie are having a competition to see how many 'likes' they get for pictures of their pets wearing a superhero costume. By Monday, Peter had 4378 likes and gets 4678 more by the end of the week. If Archie has 1578 fewer, how many likes did he get?**	

Multiplication and Division – **Year 4**

Year 4 statutory requirements:

- Recall multiplication and division facts up to 12 x 12
- Use place value known and derived facts to multiply and divide mentally including: multiplying by 0 and 1, dividing by 1 and multiplying together 3 numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply 2 and 3 digit numbers by a one digit number using formal written layout
- Solve problems involving multiplying and adding, including using the distributive law to multiply 2 digits by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects
- Recognise and show, using diagrams, families of common equivalent fractions
- Count up and down in hundredths; recognise that hundredths arise when dividing a number by 100 or tenths by ten (place value)
- Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- Recognise and write decimal equivalents of any number of tenths and hundreds
- Recognise and write decimal equivalents to ¼, ½ and ¾
- Find the effect of dividing a 1 or 2-digit number by 10 or 100. Identify the value of the digits in the answer as ones, tenths and hundredths
- Round decimals with 1 decimal place to the nearest whole number
- Compare numbers with the same number of decimal places up to two decimal places
- Solve simple money and measure problems using fractions and decimals to two decimal places
- Recognise a family of common equivalent fractions

Multiplication and Division – **Year 4**

Multiplication Key concepts	Examples	Key vocabulary
Develop recall multiplication and division facts up to 12 x 12		Factor, integer, brackets, scaling problems, systematic.
Multiply 3 numbers together using an efficient mental method	**6 x 3 x 2** **3 x 2 =6** **6 x 6 = 36**	
Recognise and use factor pairs	**Factor Bug:** 	

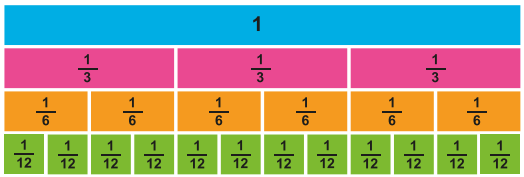
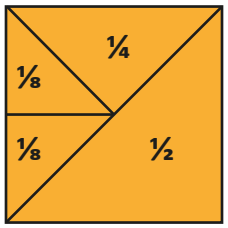
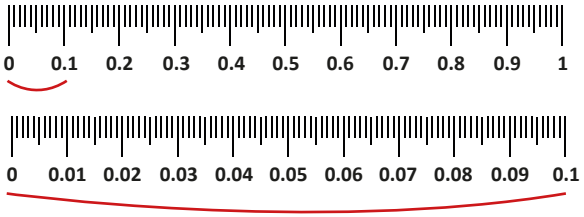
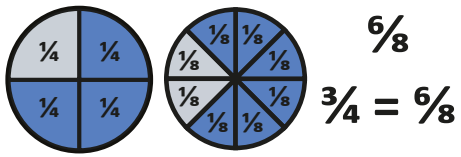
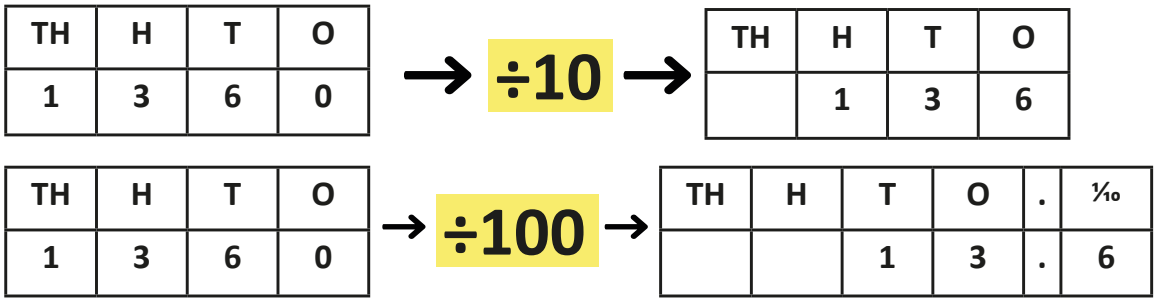
x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Multiplication and Division – **Year 4**

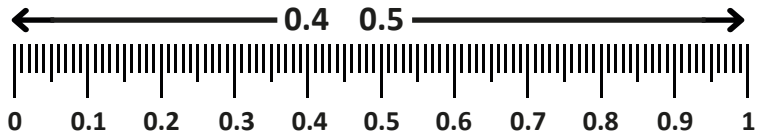
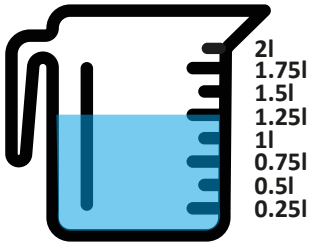
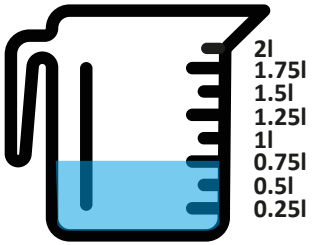
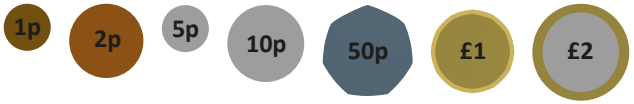
<table>
<tr><th>Multiplication Key concepts</th><th>Examples</th><th>Key vocabulary</th></tr>
<tr><td>Use formal methods to multiply 2 or 3 digit numbers by one number</td><td>
<table>
<tr><td>x</td><td>30</td><td>6</td></tr>
<tr><td>4</td><td>10 10 10
10 10 10
10 10 10
10 10 10</td><td>1 1 1 1 1 1
1 1 1 1 1 1
1 1 1 1 1 1
1 1 1 1 1 1</td></tr>
</table>
→
36
x 4
144
2
</td><td rowspan="3">Factor, integer, brackets, scaling problems.</td></tr>
<tr><td>Use knowledge and x tables to solve scaling problems</td><td>
2 eggs
150g flour
180g sugar
Suzy wants to bake 12 cupcakes. The ingredients given are for 14 cupcakes. How much flour will she need?

<table>
<tr><th>Cupcakes</th><th>Flour</th></tr>
<tr><td>14</td><td>150g</td></tr>
<tr><td>12</td><td>900g</td></tr>
</table>
x3 ↑ ↓ x3
</td></tr>
<tr><td>Solve problems using distributive law to multiply 2 digits by one digit</td><td>
Example 1:
23 x 6 = 20 x 6 + 3 x 6 = 120 = 18 = 138
Example 2:
31 x 5 = 30 x 5 + 1 x 5 = 150 + 5 = 155
</td></tr>
</table>

Multiplication and Division – **Year 4**

Division Key concepts	Examples	Key vocabulary
Recognise and show equivalent fractions	**Recognise:**  **Square:** 	Factor, integer, brackets, scaling problems, decimal, decimal point, tenths, hundredths.
Recognise tenths and hundredths as divisions of a whole and be able to write equivalents of any tenths or hundredths		
Recognise and write decimal equivalents to ¼, ½ and ¾	¼ = ²⁄₈  ⁶⁄₈ ¾ = ⁶⁄₈	
Know the effect of dividing by 10 and 100		

Multiplication and Division – **Year 4**

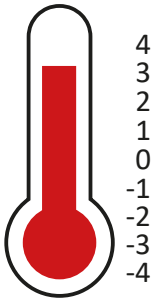
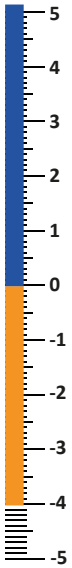
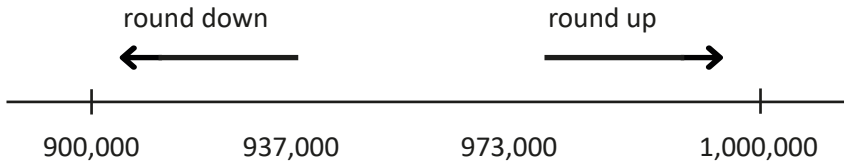
Division Key concepts	Examples	Key vocabulary
Round decimals to the nearest whole number	 **Nearest whole number to 0.4 = 0** **Nearest whole number to 0.5 = 1**	Factor, integer, brackets, scaling problems, decimal, decimal point, tenths, hundredths.
Compare numbers with the same number of decimal places	  **1.25l > 0.75l**	
Solve simple money and measure problems	 Using 2 of the coins each time, how many different amounts can you make? Show which coins you used to make the totals and give the amount in pounds **e.g. £1 + 20p = £1.20, 2p + 5p = £0.07** Now put all the possible amounts in order.	
Calculate quantities and fractions to divide, including non-unit fractions where the answer is a whole	I am reading a book with 60 pages. I have read ⅗ of it. How many pages have I read?	

Addition and Subtraction – **Year 5**

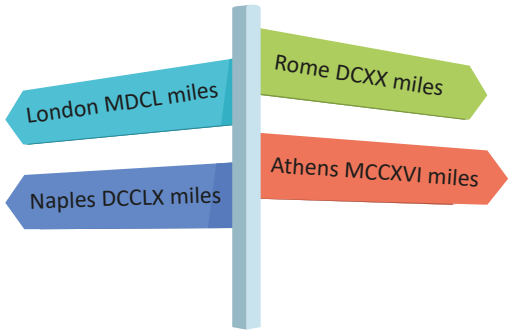
Year 5 statutory requirements:

- Read, write, order and compare numbers to at least a million, determine the value of each digit
- Count forwards or backwards in steps of powers of ten
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero
- Round any number up to a million, to the nearest 10, 100, 1000, 10,000 and 100,000
- Read Roman numerals to 1000 (M)
- Add and subtract whole numbers and numbers with up to two decimal places with more than 4 digits using formal written methods
- Add and subtract numbers mentally with increasingly large numbers
- Use rounding to check answers in the context of problems
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why

Addition and Subtraction – **Year 5**

Key addition and subtraction concepts	Examples	Key vocabulary
Know and write place value up to a million	Know and write: **784,082** **Seven hundred and eighty four thousand and eighty two.** **The 7 digit is worth seven hundred thousand.**	Multi-step, powers, place holder, approximate.
Interpret negative numbers in context	Car park levels: 2 = Level 2 1 = Level 1 0 = Ground level -1 = Lower ground level -2 = Lower, lower ground level  	
Round numbers up to a million		

Addition and Subtraction – **Year 5**

Key addition and subtraction concepts	Examples	Key vocabulary
Read Roman numerals to 1000	 **What distances did the Roman centurians travel from their starting point to the 4 destinations?**	Multi-step, powers, place holder, approximate.
Use formal methods to add and subtract – use place value to ensure columns are aligned. Where necessary, a zero should be added as a place holder	In year 5 and 6, pupils should be adding numbers using compact column addition method. 46892 + 32758 = 79650 (1 1 1) **When adding decimals, it is essential that the decimal point does not move and is kept in line.** Where necessary, a zero should be added as a **place holder:** 16.5 + 23.7 = 40.2 (1 1)	
Use rounding and estimation to check accuracy	**Use the numbers to complete the sentences. Do your answers make sense?** 6,678 · 12,000 · 29,812 · 8,100 · 11,583 · 2,967 [ ] **+ 1,350 is approximately** [ ] **15,412** - [ ] **is approximately** [ ]	
Add and subtract fractions	(x2) $\frac{1}{3} + \frac{2}{6} = \frac{2}{6} + \frac{2}{6} = \frac{4}{6}$ (x2) (x2) $\frac{3}{5} - \frac{2}{10} = \frac{6}{10} - \frac{2}{10} = \frac{4}{10}$ (x2)	

Addition and Subtraction – **Year 5**

<table>
<tr><th>Key addition and subtraction concepts</th><th>Examples</th><th>Key vocabulary</th></tr>
<tr><td>Solve multi-step problems deciding on operation and method to be used</td><td>Use Discussion Problems

This shows the downloads of the most popular acts during the last 3 weeks. Unfortunately, when it was uploaded to the website, some of the numbers did not transfer. The totals column is in decending order.

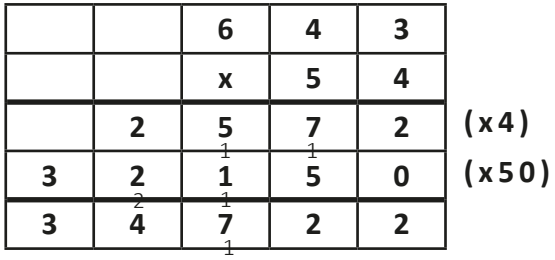
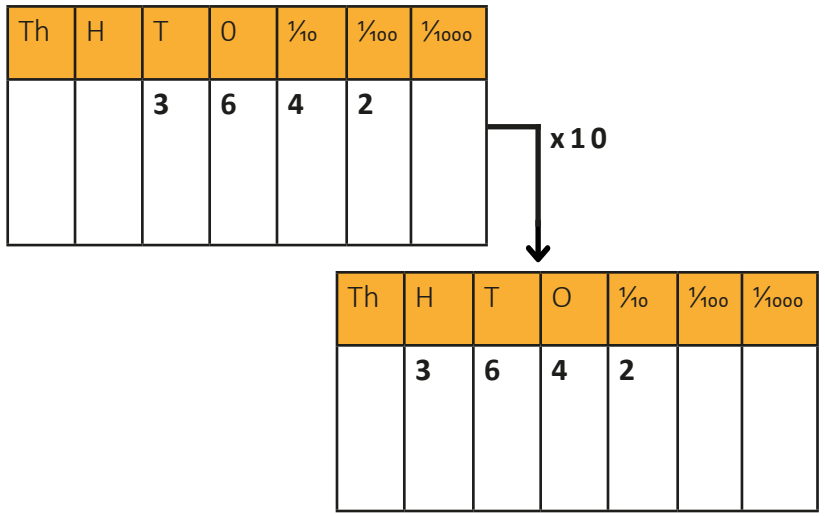
<table>
<tr><th></th><th>Week 1</th><th>Week 2</th><th>Week 3</th><th>Total</th></tr>
<tr><td>Band Axis</td><td>8,791</td><td>962</td><td>9,004</td><td>□□,□□□</td></tr>
<tr><td>Rag+Bits Man</td><td>2,031</td><td>7,456</td><td>□,□□□</td><td>14,485</td></tr>
<tr><td>Silly Myras</td><td>□,□□□</td><td>3,□□□</td><td>8,162</td><td>□□, 152</td></tr>
<tr><td>Will.i.is</td><td>4,512</td><td>□,□□□</td><td>□,□□□</td><td>12, □□□</td></tr>
</table>
</td><td>Multi-step, powers, place holder, approximate.</td></tr>
</table>

Multiplication and Division – **Year 5**

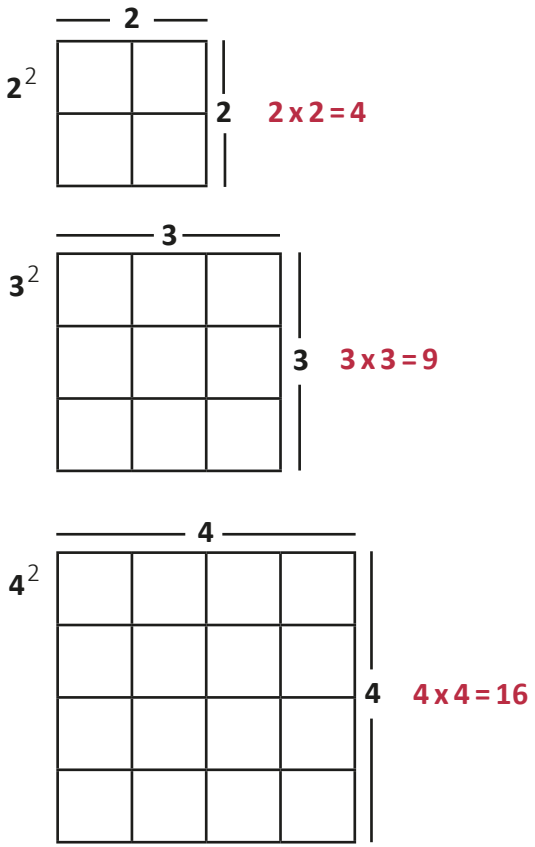
Year 5 statutory requirements:

- Identify multiples and factors including all factor pairs of a number and common factors of two numbers
- Know and use the vocabulary of prime numbers, prime factors and composite numbers (non-prime)
- Establish whether a number up to 100 is prime and recall prime numbers to 19
- Multiply numbers up to 4 digits by one or a two digit number using formal written methods including long multiplication methods for two digits
- Multiply and divide numbers mentally drawing on known facts
- Divide numbers up to 4 digits by a one digit number using short division and interpret remainders appropriately for the context
- Multiply and divide whole numbers and those including decimals by 10, 100 and 1000
- Recognise and use square and cubed numbers and the notation
- Solve problems using multiplication and division including their knowledge of factors and multiples, squares and cubes
- Solve multi-step problems using the four operations
- Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates
- Compare and order fractions whose denominators are all multiples of the same number
- Identify, name and write equivalent fractions, represented visually
- Recognise mixed numbers and improper fractions and convert from one form to the other
- Multiply proper fractions and mixed numbers by whole numbers (supported by apparatus or diagram)
- Read and write decimal numbers as fractions
- Recognise and use thousandths and relate them to tenths, hundreds and decimal equivalents
- Round decimals with two decimal places to the whole and one decimal place
- Read, write, order and compare numbers with up to three decimal places
- Solve problems involving numbers with 3 decimal places
- Recognise the % symbol and understand that % relates to the number of parts per 100, write percentages as a fraction with the denominator of 100 and as a decimal
- Solve problems that require knowing percentage and decimal equivalents of ½, ¼, ⅕, ⅖, ⅘ and those fractions with a denominator with a multiple of 10 and 25

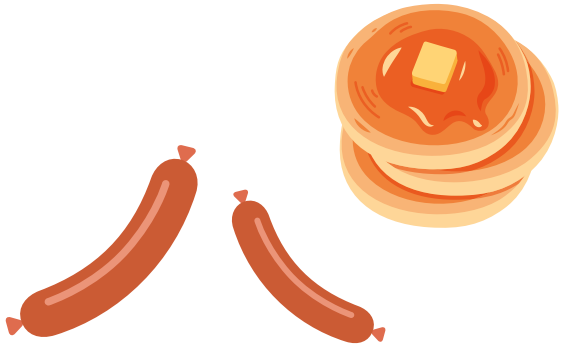
Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Introduce long multiplication		Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.
Multiply and divide whole numbers and those including decimals by 10, 100 and 1000	**To multiply by 10, 100, 1000, children should use place value charts to show that the digit moves a column(s) to the left. The value of the digit is increasing by 10, 100 or 1000 times.** 	

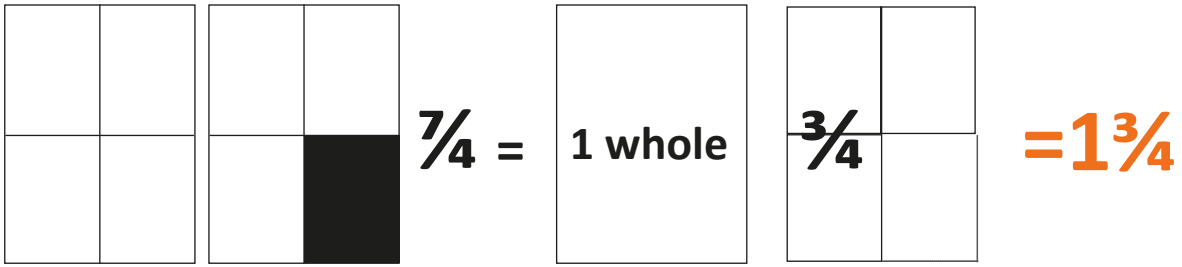
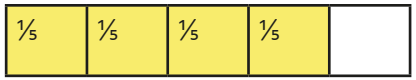
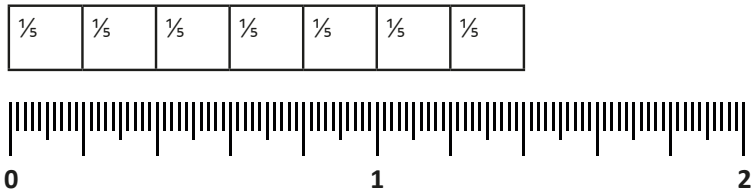
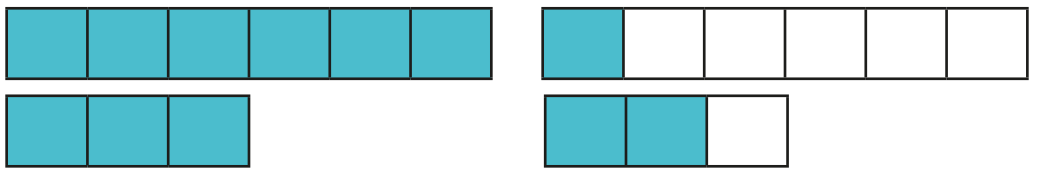
Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Recognise and use square and cubed numbers and the notation	**Square numbers:**  2^2 2 2 2 x 2 = 4 3^2 3 3 3 x 3 = 9 4^2 4 4 4 x 4 = 16 **Cube numbers:** 2^3 2 2 2 2 x 2 x 2 = 8 3^3 3 3 3 3 3 x 3 x 3 = 27	Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.

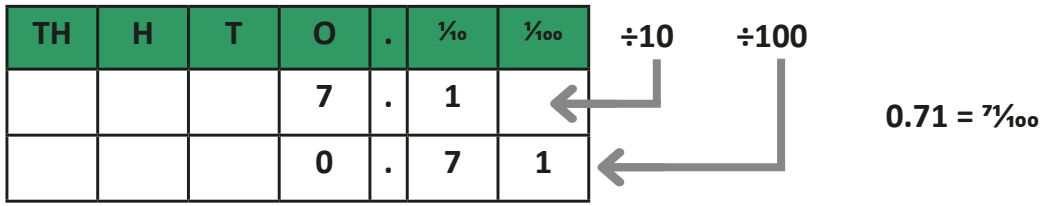
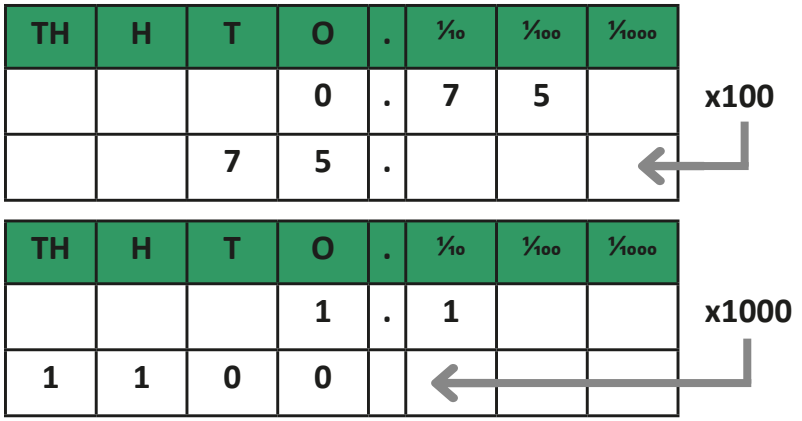
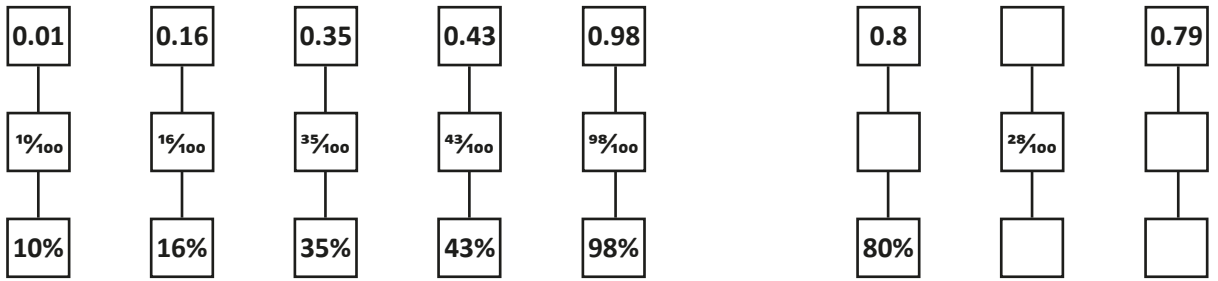
Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates	**Sam makes 3 pancakes every 6 minutes, that is a rate of:** • 3 pancakes per 6 minutes • 0.5 pancakes per minute • 30 pancakes per hour • an hourly rate of 30 **200 sausages were eaten by 50 people. That is:** • 200 sausages per 50 people • 100 sausages per 25 people • 4 sausages per person  **Multiplication and division problem:** She builds an extension and it makes the house ⅓ bigger. How much bigger will it be?	Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.
Order fractions by converting to the same denominator	**Comparing Fractions:** **If the denominators are the same, the fraction with the bigger numerator is the larger...** $\frac{1}{6} < \frac{3}{6}$ **Here we just need to compare the denominators...** $\frac{2}{5} < \frac{2}{3}$ **The larger the denominator the smaller the fraction... so if the numerators are the same, the fraction with the larger denominator is the smallest.** $\frac{1}{3} > \frac{1}{6}$ 	

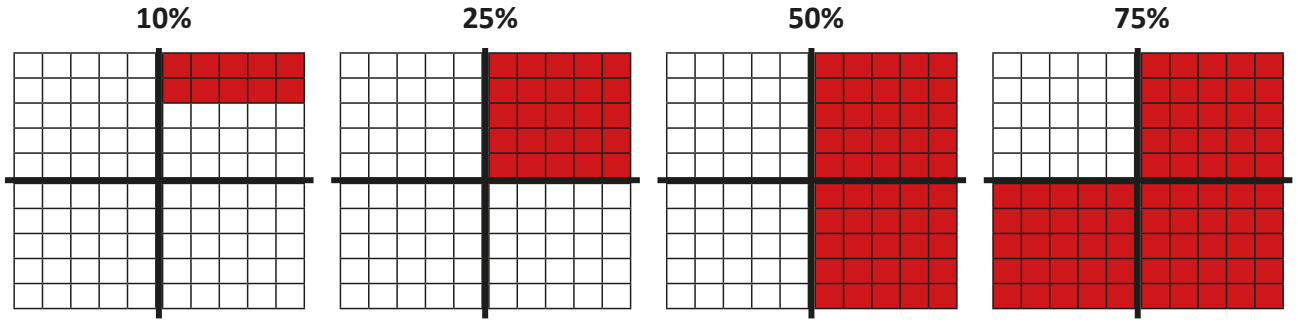
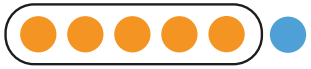
Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Recognise mixed numbers and improper fractions and convert from one form to the other	**2 sheets of A4 paper** 	Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.
Multiply proper fractions and mixed numbers by whole numbers	**Key learning is the denominator stays the same and only the numerator is multiplied.** ⅕ x 4 = ⅘  ← ⅘ → ⅕ x 7 = ⅞ =1⅖  **Use bar models to compare e.g. ⅙ and ⅔**  ⅙ or 1⅙ ⅔ or 1⅖ ⅔ > ⅙ or 1⅙ < 1⅖	

Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Read and write decimals as fractions		Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.
Read, write order and compare numbers with up to 3 decimal places	**124cm** **0.75m x 100 = 75cm** **65mm x 10 = 6.5cm** **1.4m x 100 = 140cm** **1.1cm x 1000 = 1100cm**  **Ascending order: 65mm, 0.75m, 124cm, 1.4m, 1.1km**	
Recognise the % symbol and know % relates to the number of parts per 100		

Multiplication and Division – **Year 5**

Key concepts multiplication and division	Examples	Key vocabulary
Recognise the % symbol and know % relates to the number of parts per 100	 **1/10 = 0.1** **1/4 = 0.25** **1/2 = 0.5** **3/4 = 0.75** **The whole amount of something is 100 percent** **=100%** **Percentages can be less than 100%** (of whole set of 5 circles, one is blue, this is 20% of the whole) **=20%** **Or more than 100%** (an extra circle has been added to the group. there are now 6, this is 120% of the whole)  **=120%**	Prime numbers, rate, percentage/s, mixed number, improper fraction, proper fraction, long multiplication, remainder, square, cube.
Further secure pupils' understanding of compact short division	**218÷8=** $\begin{array}{r} 27\text{ r }2 \\ 8\overline{)\cancel{2}^{2}1^{5}8} \end{array}$	

Addition, Subtraction, Multiplication and Division – **Year 6**

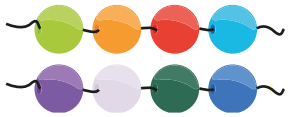
Year 6 statutory requirements:

- Read, write, order and compare numbers up to 10,000 000 and determine the value of each digit
- Round any number to a required degree of accuracy
- Use negative numbers in context
- Solve number and practical problems
- Multiply multi-digit numbers up to 4 digits by 2 digits using long multiplication
- Divide numbers of up to 4 digits by a two digit number using the formal written method of long division and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context
- Divide numbers up to 4 digits by a two digit number using short division where appropriate, interpreting remainders according to context
- Perform mental calculations including mixed operations and large numbers
- Identify common factors, common multiples and prime numbers
- Use knowledge of the order of operations
- Solve multi-step problems using four operations – deciding which operations to use and why
- Use estimation to check answers
- Use common factors to simplify fractions
- Compare and order fractions including fractions greater than 1
- Add and subtract fractions with different denominators and mixed numbers using the concept of equivalent fractions
- Multiply simple pairs of proper fractions, writing the answer in its simplest form
- Divide proper fractions by whole numbers
- Associate a fraction with division and calculate decimal fraction equivalents
- Multiply and divide by 10, 100 and 1000, using numbers with 3 decimal places
- Multiply numbers with 2 decimal places with whole numbers
- Use written division methods where the answer has up to 2 decimal places
- Solve problems which require answers to be rounded
- Recall and use equivalences between simple fractions, decimals and percentages in different contexts

Addition, Subtraction, Multiplication and Division – **Year 6**

Key concepts	Examples	Key vocabulary
(build on learning from year 5) Multiply numbers using compact short multiplication	643 x 8 643 x 8 5144 3 2 643 x 54 $2^{1}5^{1}72$ + 32150 34722	Long division, short division, recurring.
Use long division to divide numbers up to 4 digits by a 2 digit number (no remainders initially)	**No remainder:** 034 14) 476 − 42 ↓ 56 56 0 14 28 42 56 **With remainder:** 024 r 12 24) 588 − 48 ↓ $^{0}\cancel{1}^{1}08$ 96 12 24 48 72 96	
Use short division to divide numbers up to 4 digits by 2 digits	0135.6$\dot{6}$ 15) 2035.00 **Note: Teach recurring symbol** (dot above the number) $\dot{6}$	
Subtraction with decimals	When subtracting decimals, it is essential that the decimal point does not move and kept in line. Where necessary, a zero should be added as a ***place holder.*** 4 $\cancel{5}.^{1}37$ − 2.54 2.83 $\cancel{1}$ $^{9}\cancel{10}$ $^{1}5$. $^{3}\cancel{4}$ $^{1}1$ 9 kg 3 6 . 0 8 0 kg 6 9 . 3 3 9 kg	
Use BIDMAS to order of operations to carry out calculations	**Brackets, indices (2 squared, 6 cubed), division, multiplication, addition and subtraction**	

Addition, Subtraction, Multiplication and Division – **Year 6**

Key concepts	**Examples**	**Key vocabulary**
Solve multi-step problems using four operations	Layla makes jewellery to sell at a school fair. Each bracelet has **53** beads. She makes **68** bracelets. Each necklace has **105** beads. She makes **34** necklaces.  How many beads does Layla use **altogether**?	Long division, short division, recurring.
Multiply simple pairs of proper fractions, writing the answer in its simplest form	**¼ x ½ = ⅛** Key learning is to **multiply the denominator**	
Dividing proper fractions by whole numbers	**⅓ (keep) divided by 2** **Make the whole number into a fraction** **2/1** **Turn the fraction upside down (flip) ½** **Then multiply** **⅓ x (change) ½ = ⅙** **⅓ ÷ 2/1 =** **⅓ x ½ = ⅙** ***keep, flip & change***	
Turn a fraction into a decimal	**Divide the numerator by the denominator** **⅜ which is 3 divided by 8 which is 0.375**	
Use compact multiplication to multiply numbers with 2 decimal places with whole numbers	7.68 x 4 30.72 2 3 ↓ **decimals lined up and in first**	