West Park Academy
Calculation Guidance

Addition

addend + addend = sum

Key vocabulary to be used from Year 1.

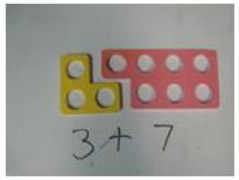
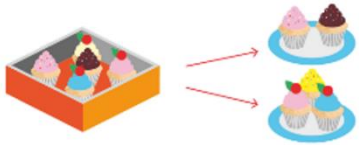
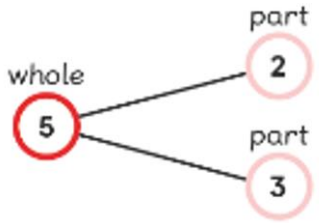
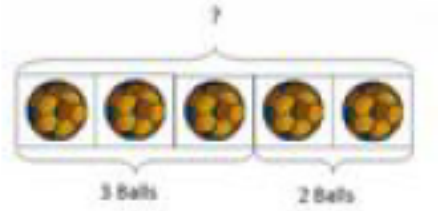
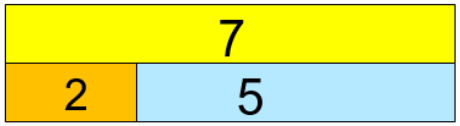
Year 1

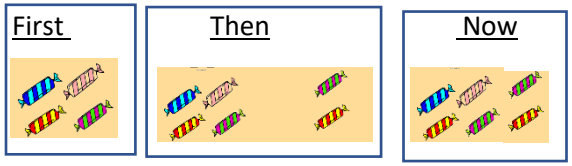
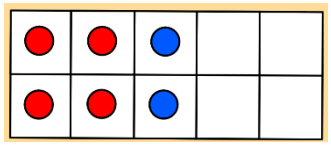
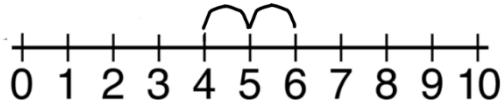
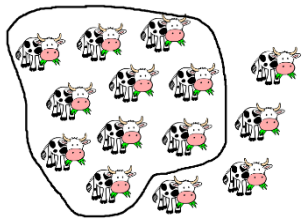
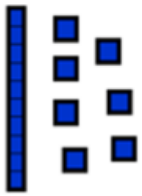
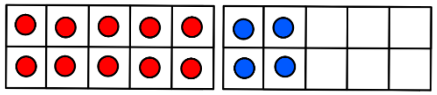
Read, write and interpret mathematical statements involving addition (+), subtraction (-), and equals (=) signs

Represent and use number bonds and related subtraction facts within 20.

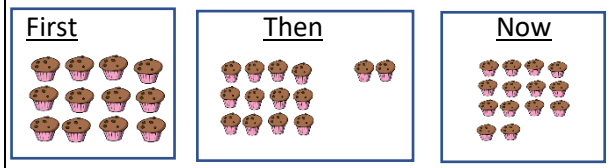
Add and subtract one digit and two digit numbers to 20, including 0.

Number bonds and fact families

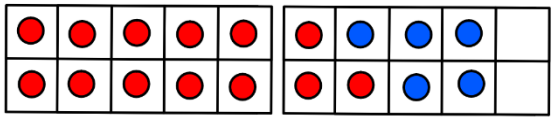
Concrete	Pictorial	Abstract
     	  	2 and 3 make 5. 2 + 3 = 5

Adding together and adding more (starting with bigger number)		
Concrete	Pictorial	Abstract
<u>Working within 10</u>   First Jack had ___ sweets. Then he was given ____ more. Now he has _____ sweets.	 First there were _____. Then _____ more were added. Now there are _____. 	4 + 2 = 6
<u>10 plus a number</u>   		10 + 6 = 16

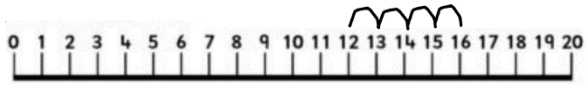
Working within 20 (without crossing 10).



First there were _____ cakes.
Then ____ were added.
Now there are _____ cakes.



First there were _____.
Then _____ more were added.
Now there are _____

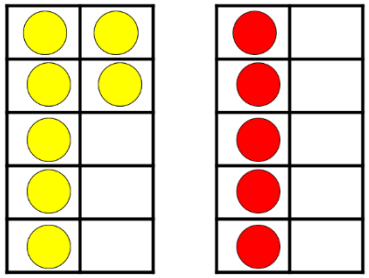
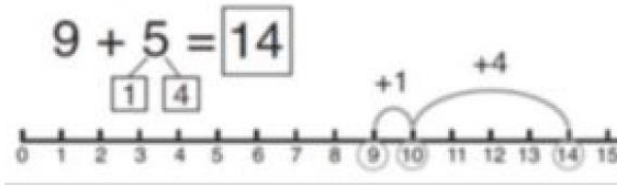


12 + 6 = 18

2 + 6 = 8

12 + 6 = 18

Children should also begin to spot “friendly facts” in the calculation which can support them with the calculation.

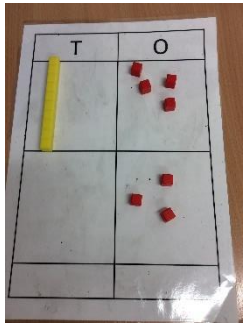
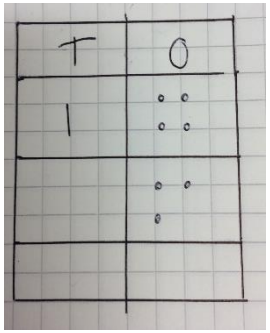
Add by making 10		
Concrete	Pictorial	Abstract
 Children to use tens frames to show how to partition a number to make 10 first.	 Children then move to this format where they are showing how they can partition the number to make 10 first. Children can also use a number line to show this.	9 + 5 = 14

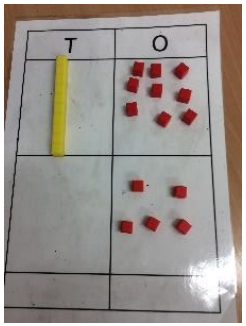
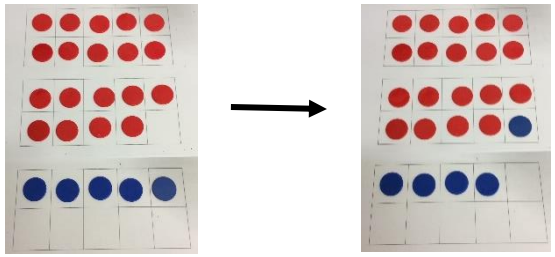
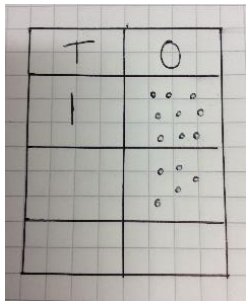
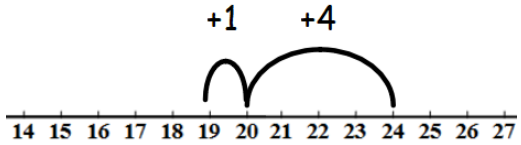
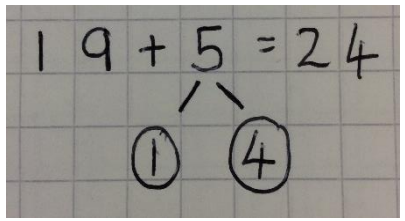
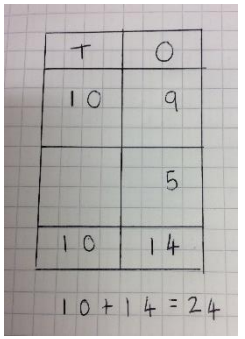
Year 2

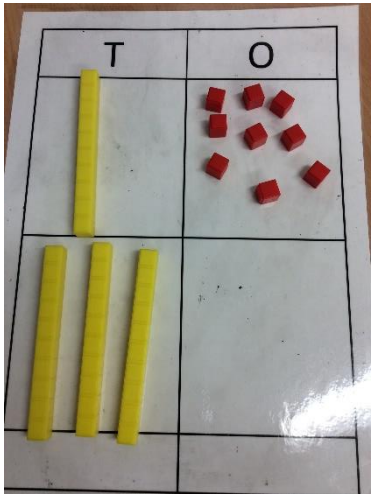
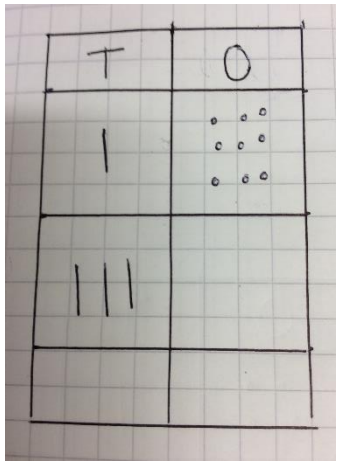
Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

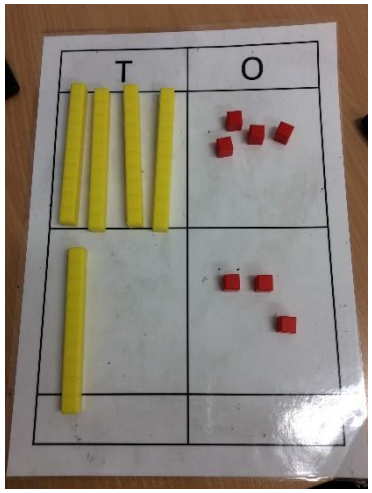
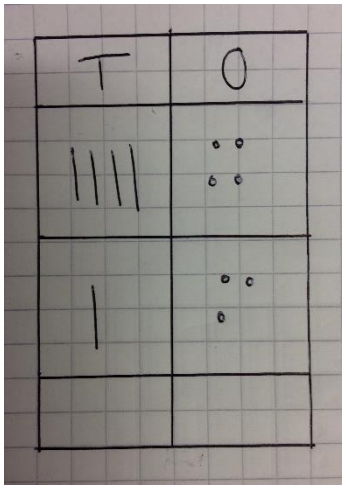
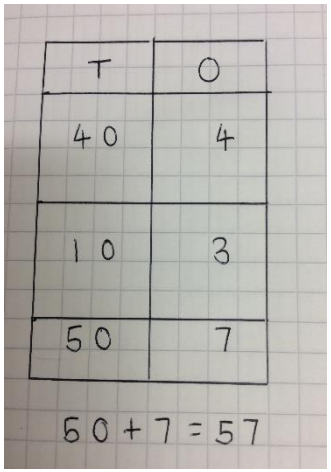
- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers

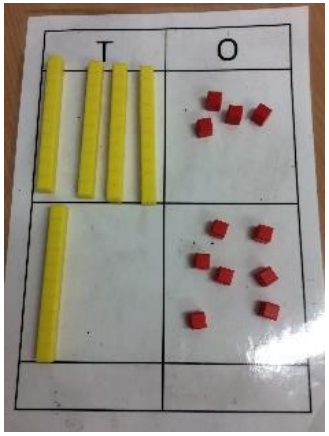
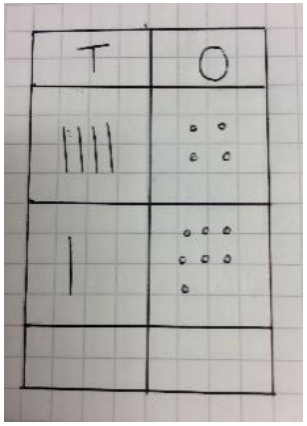
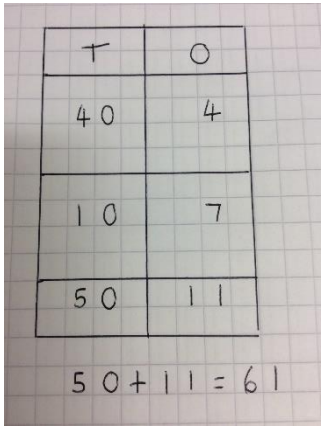
Two-digit number add ones (not bridging)

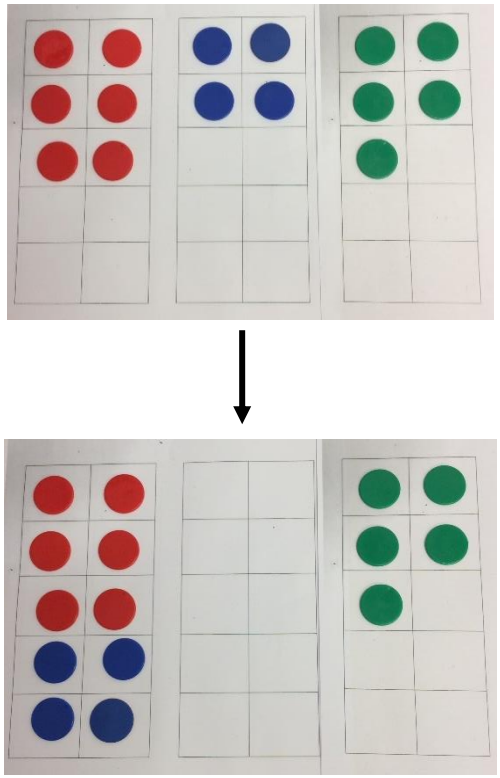
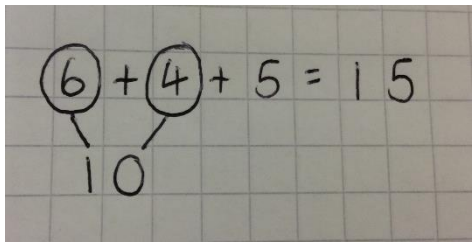
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add ones.  Stem sentence – We can just add the ones.	Children can then use simple drawing to support with their working out.  	Children to then work with abstract. Children will be encouraged to spot friendly facts that can support them with their learning. 14 + 3 = 17 4 + 3 = 7 14 + 3 = 17

Two-digit number add ones (bridging)		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add ones. No regrouping at this point.  This can also be shown using tens frames. 	Children can then use simple drawing to support with their working out.  This can also be shown using number lines.   	Children to continue to work with tens/ones frames but use numbers.  19 + 5 = 24

Two digit numbers add tens		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add tens.  Stem sentence – We can just add the tens.	Children can then use simple drawing to support with their working out.  	19 + 30 = 39

Adding 2 two digit numbers (1)		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add two digit numbers. 	Children can then use simple drawing to support with their working out. 	Children to continue to work with tens/ones frames but use numbers. 

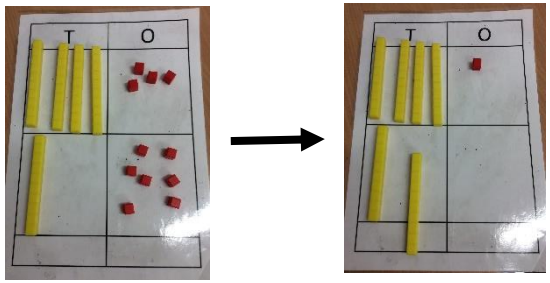
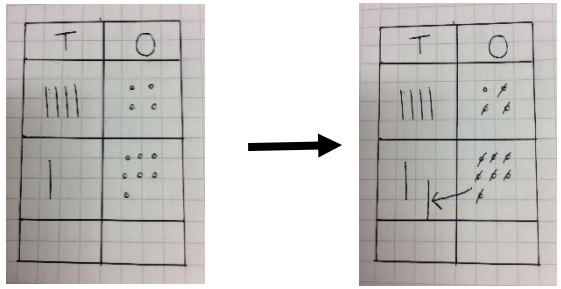
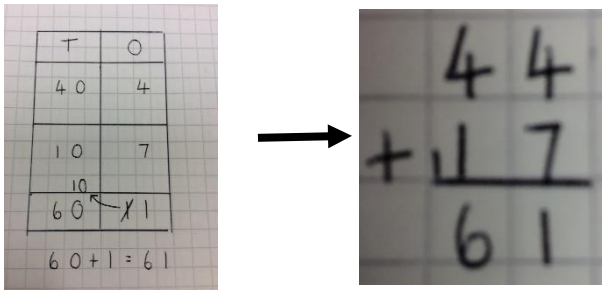
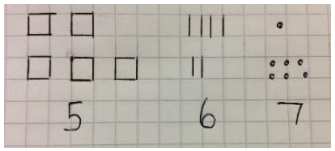
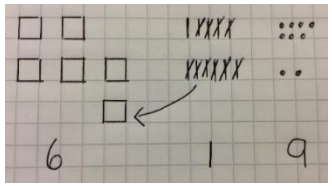
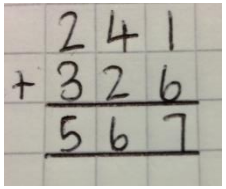
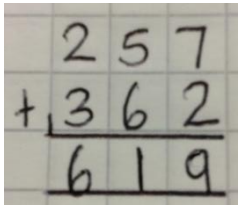
Adding 2 two digit numbers (2)		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add two digit numbers. Children to not regroup at this point.  	Children can then use simple drawing to support with their working out.  	Children to continue to work with tens/ones frames but use numbers. 

Adding 3 one digit numbers		
Concrete	Pictorial	Abstract
Children to use tens frames and encourage to make 10 where possible. 		6 + 4 + 5 = 15

Year 3

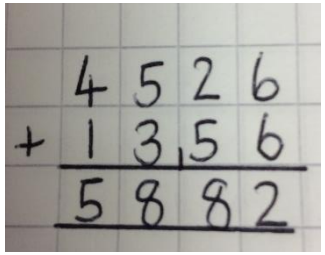
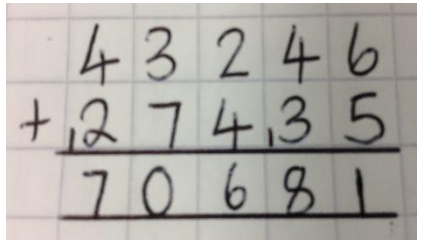
Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Column addition

Concrete	Pictorial	Abstract
Year 3 to recap year 2 method (see year 2) and introduce the idea of exchanging 10 ones for 1 ten.  	This can be shown with pictorial method of simple picture.  	Children to begin with year 2 method but then to move to column addition. 
Children then move to working with 3 digits. 	Children to use simple pictures to add 3 digits.   	Children to then use column addition to add 3 digits.  

Year 4
Add numbers with up to 4 digits using the formal written method of column addition.
Year 5
Add whole numbers with more than 4 digits, including using formal written method (column addition)
Year 6
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Column addition

Concrete	Pictorial	Abstract
Children to recap learning in year 3 (see year 3). Dienes used to highlight exchange. Concrete to be used more in year 4 but years 5 and 6 can use if needed to recap.	Children should be able to work out answers/ prove answers are correct using simple pictures with up to 3 digits (see year 3). All children in years 4, 5 and 6 should be confident in using simple pictures.	Children will use the method of column addition and have a good understanding of how and why the method is effective. They will be able to work with numbers with any number of digits.  

Subtraction

minuend - subtrahend = difference

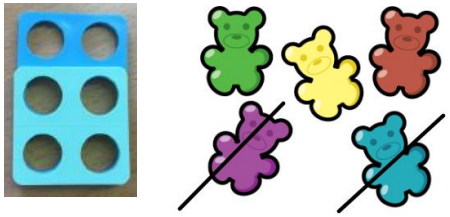
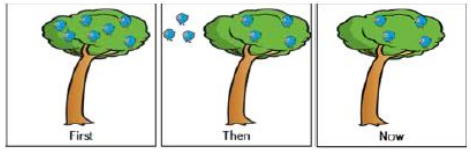
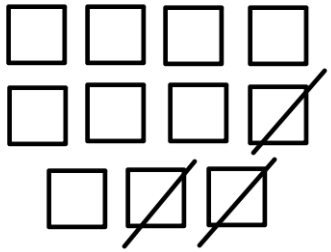
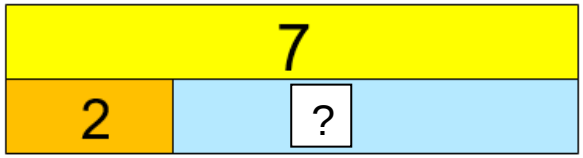
Key vocabulary to be used from Year 1.

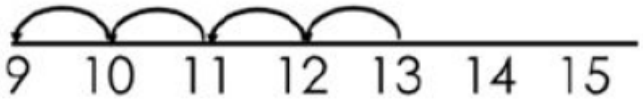
Year 1

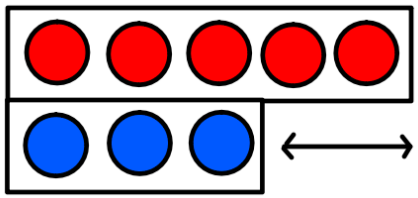
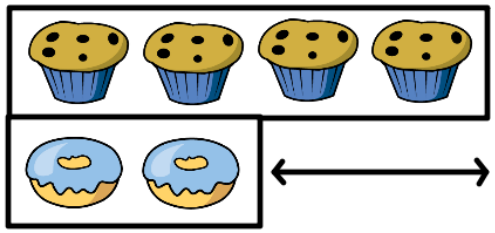
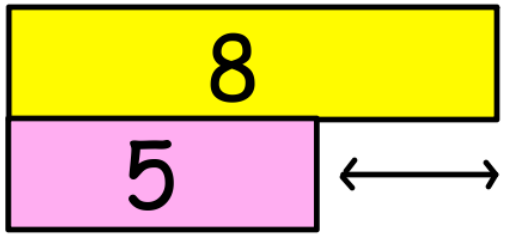
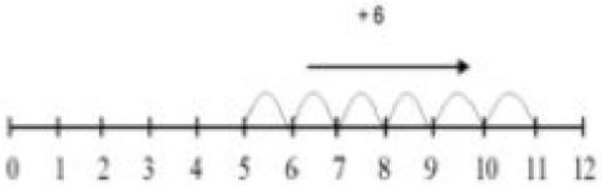
Read, write and interpret mathematical statements involving addition (+), subtraction (-), and equals (=) signs

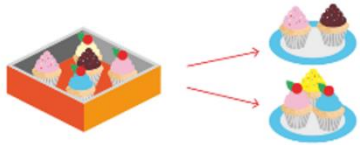
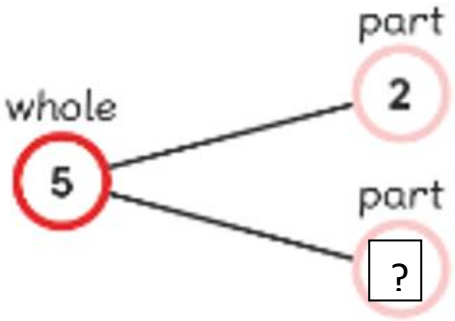
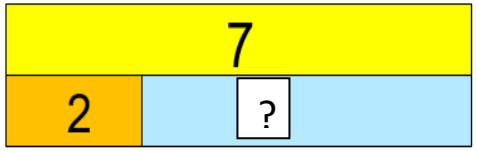
Represent and use number bonds and related subtraction facts within 20.

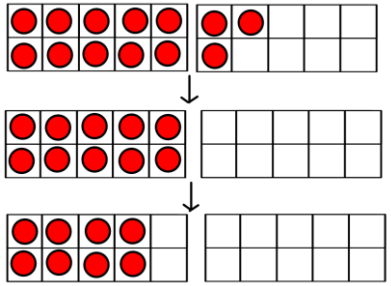
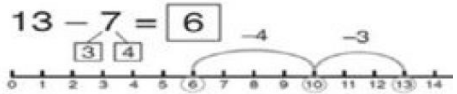
Add and subtract one digit and two digit numbers to 20, including 0.

Taking away		
Concrete	Pictorial	Abstract
Use concrete materials and stories to show objects being taken away.    At first there were _____ birds. Then _____ flew away. Now there are _____.	Children can show objects being taken away by crossing out.   	8 - 3 = 5

Counting back		
Concrete	Pictorial	Abstract
Children to use fingers to visually see counting back. 	Count back on a number line. 	Put 6 in your head. Count back 3. What number are you at? 6 - 3 = 3

Finding the difference		
Concrete	Pictorial	Abstract
  	 	I have 5 coins. Tom has 2 coins. What is the difference?

Fact families		
Concrete	Pictorial	Abstract
   **10 – 3 = 7**   Very similar resources to fact families with addition but use to show subtraction.	 	5 – 2 = 3 5 – 3 = 2
		Begin to look at subtraction first and then combine with addition to make fact families. 2 + 3 = 5 3 + 2 = 5 5 – 2 = 3 5 – 3 = 2 No answer at the beginning in Year 1.

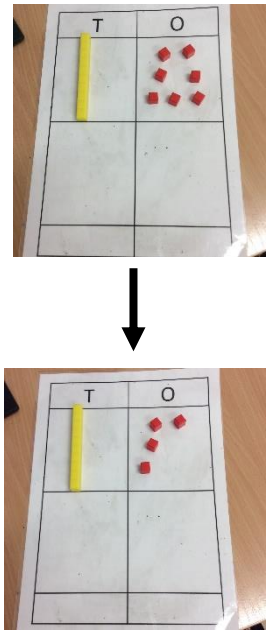
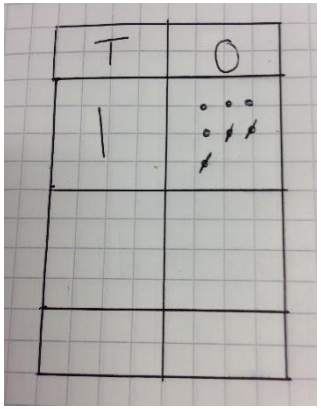
Crossing 10		
Concrete	Pictorial	Abstract
 Start with 13. Take away 3 counters to make 10. Then take away another 2 counters to take away 5 in total.	 Start with 13. Take away 3 counters to make 10. Then take away another 4 counters to take away 7 in total.	13 -7 = 6 How many to we take off to make 10? How many more do we need to take away?

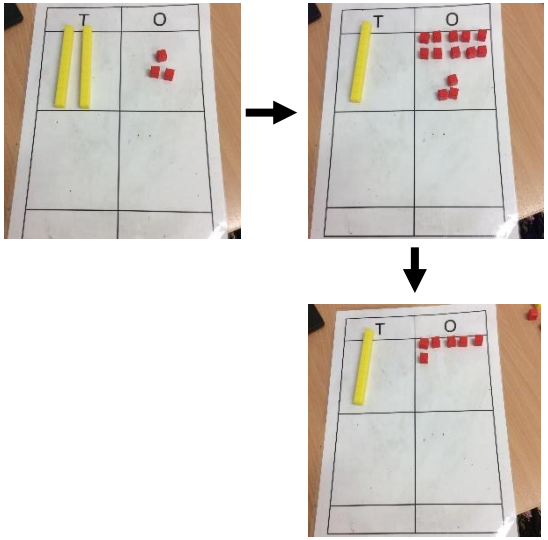
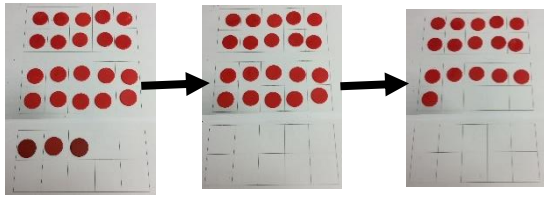
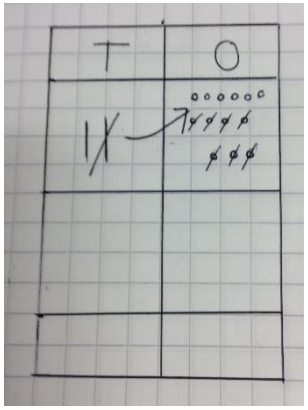
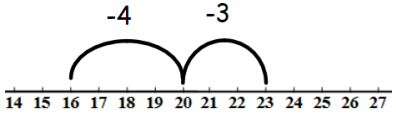
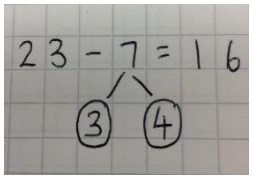
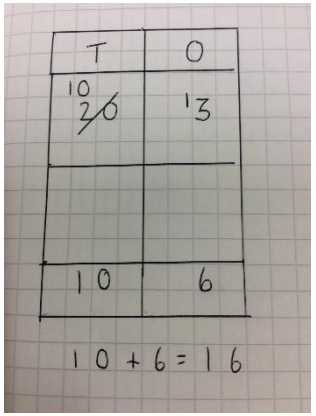
Year 2

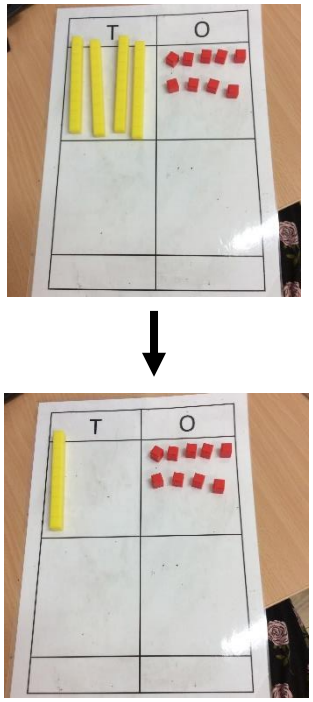
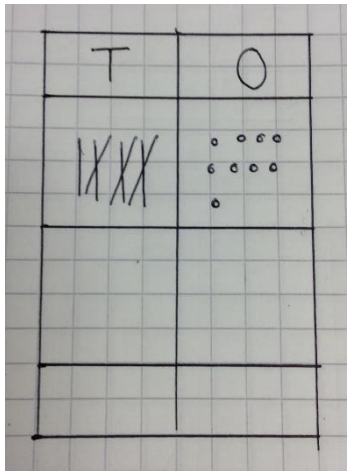
Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers

Two digit number subtract ones (no regrouping)

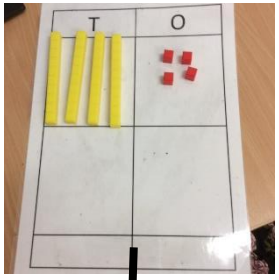
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to subtract ones.  Stem sentence – We just subtract the ones.	Children can then use simple drawing to support with their working out.  	Children to then work with abstract. Children will be encouraged to spot friendly facts that can support them with their learning. 17 - 3 = 14 7 - 3 = 4 17 - 3 = 14

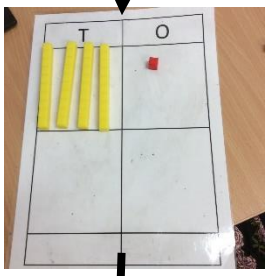
Two digit number subtract ones (regrouping)		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to subtract ones.  This can also be shown using tens frames.  Subtract the 3 to make 20. Then subtract the remaining 4 to make 16.	Children can then use simple drawing to support with their working out.  This can also be shown using number lines.   	Children to continue to work with tens/ones frames but use numbers.  Children to then work with abstract. Children will be encouraged to spot friendly facts that can support them with their learning. 23 - 7 = 16

Two digit number subtract tens		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to add tens.  Stem sentence – We just subtract the tens.	Children can then use simple drawing to support with their working out.  	49 - 30 = 19

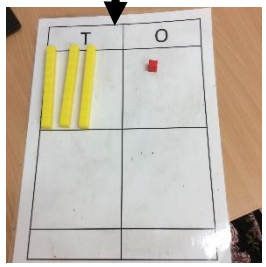
Two digit number subtract two digit number (no regrouping)

Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to subtract two digit numbers.	Children can then use simple drawing to support with their working out.	Children to continue to work with tens/ones frames but use numbers.

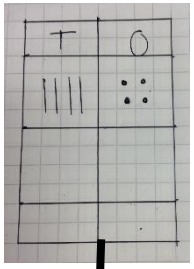


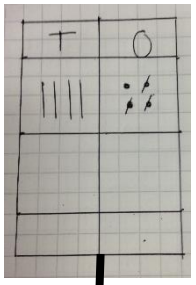


First subtract the ones.

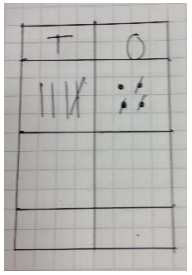


Then subtract the tens.

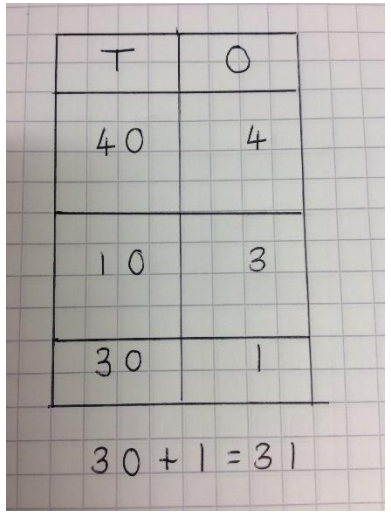


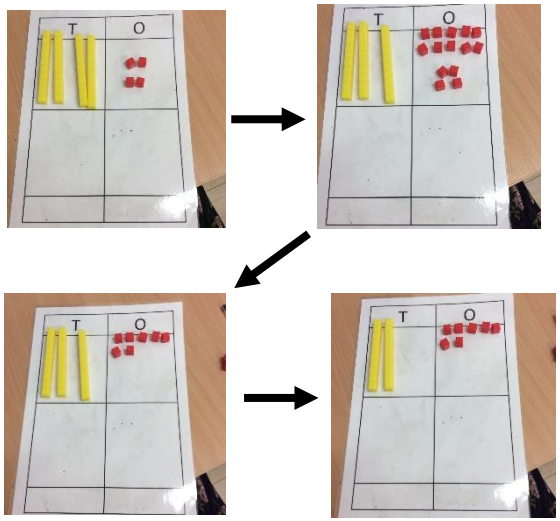
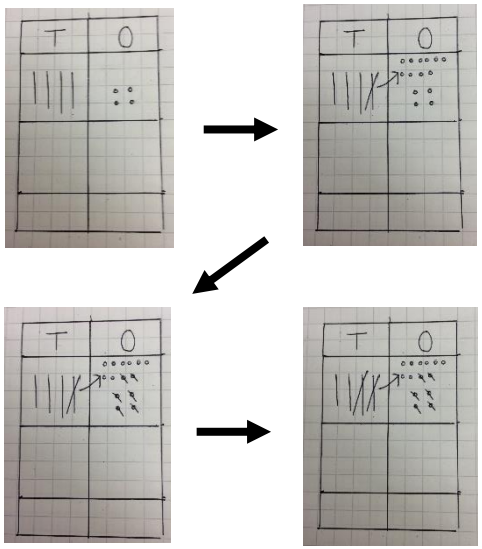
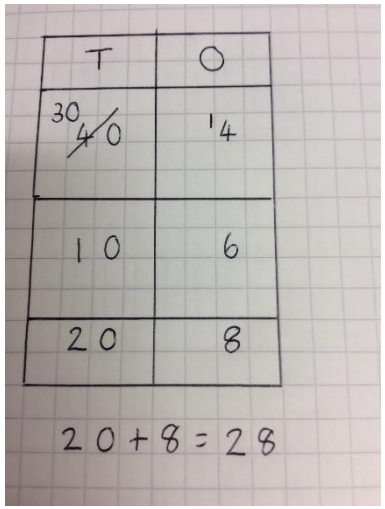


First subtract the ones.



Then subtract the tens.

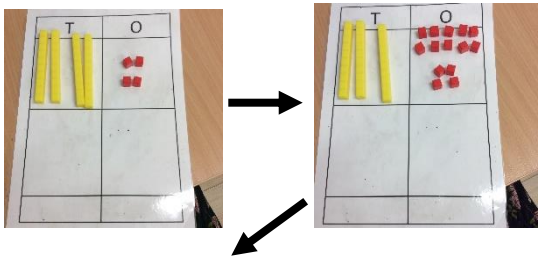
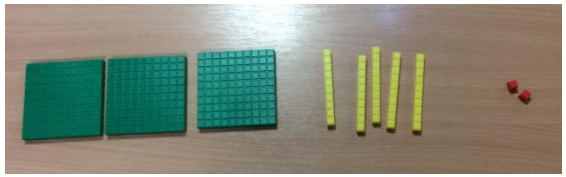
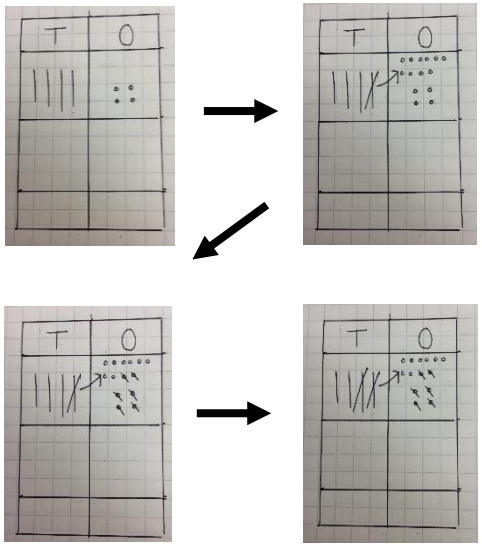
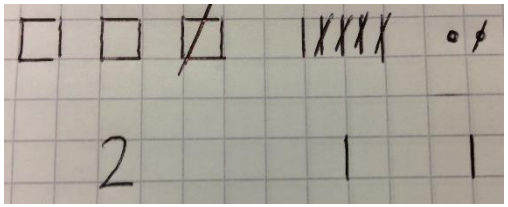
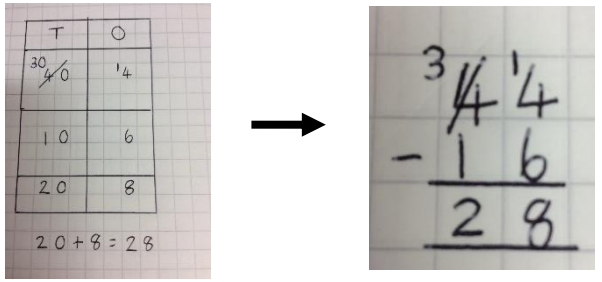
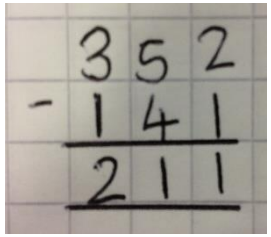


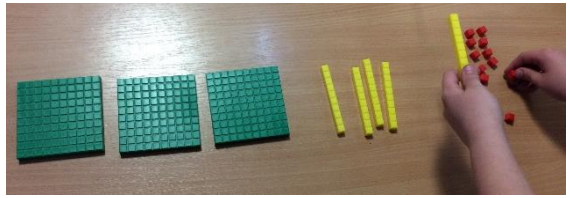
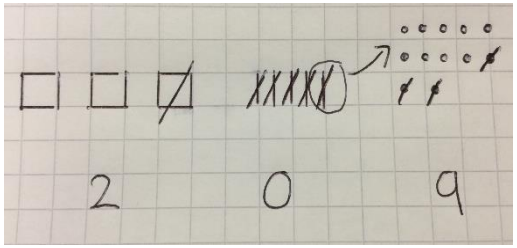
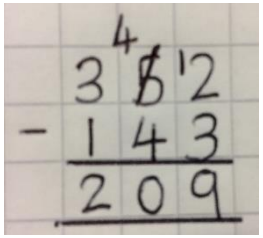
Two digit number subtract two digit number (regrouping)		
Concrete	Pictorial	Abstract
Children will use the tens/ones frame and concrete resources to subtract two digit numbers.  In the example above, children need to regroup first.	Children can then use simple drawing to support with their working out.  	Children to continue to work with tens/ones frames but use numbers. 

Year 3

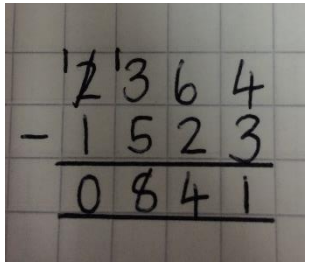
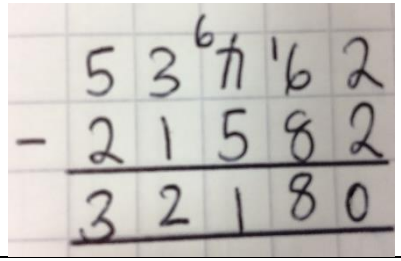
Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Column Subtraction

Concrete	Pictorial	Abstract
Children to recap method from year 2.  Children then to move to work with 3 digits. 	Children to recap year 2 method.  Children to use simple pictures to show subtraction with 3 digits.  	Children to recap year 2 method before moving to look at column subtraction.  Children will then use column subtraction when working with 3 digits. 

	 2 0 9	 4 3 B 12 - 1 4 3 2 0 9

Year 4
Subtract numbers with up to 4 digits using the formal written method of column subtraction.
Year 5
Subtract whole numbers with more than 4 digits, including using formal written method (column subtraction).
Year 6
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Concrete	Pictorial	Abstract
Children to recap learning from year 3 (see year 3). Dienes used to highlight exchange. Concrete is used more in year 4 but years 5 and 6 can use if needed to recap.	Children should be able to work out answers/ prove answers are correct using simple pictures up to 3 digits (see year 3). All children in years 4, 5 and 6 should be confident in using simple pictures.	Children to use the method of column subtraction and have a good understanding of how and why the method is effective. They will be able to work with numbers with any number of digits.  

Multiplication

factor x factor = product

Key vocabulary to be used from Year 2.

Year 1

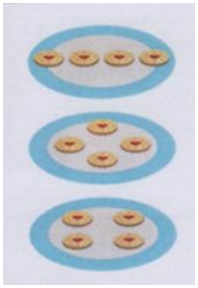
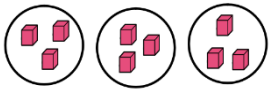
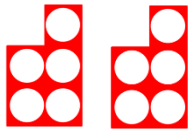
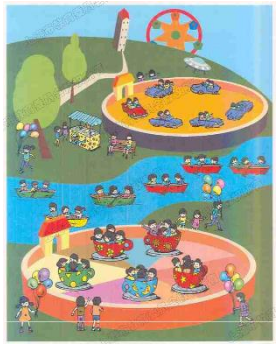
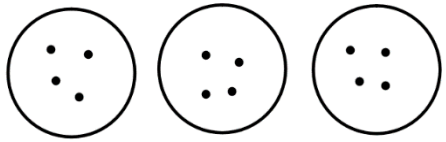
Solve simple one step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

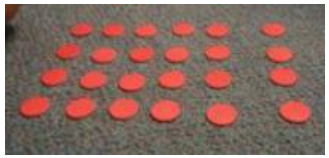
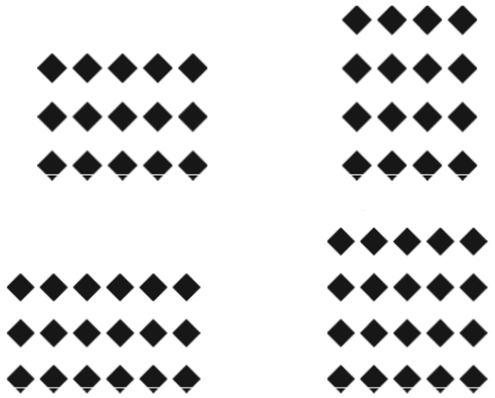
Year 2

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

Show that multiplications of two numbers can be done in any order (commutative) and division of one number by another cannot

Making and adding equal groups

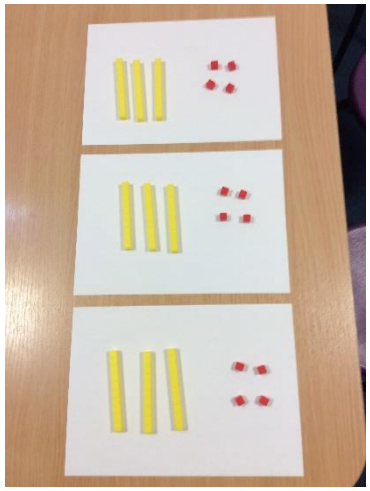
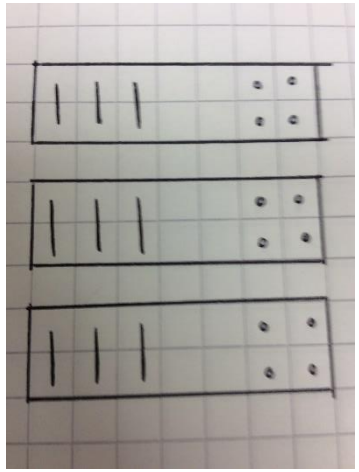
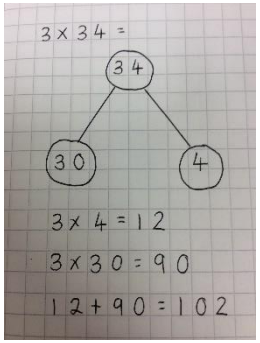
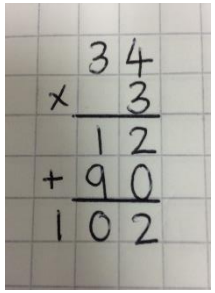
Concrete	Pictorial	Abstract
     Use concrete materials to show equal groups. Children to use stem sentence: There are _____ equal groups of _____.	  Use pictorial methods to show equal groups. Children to continue to use stem sentence: There are _____ equal groups of _____.	Once children are confident finding equal groups they are to use repeated addition to find total number. e.g. $2 + 2 + 2 + 2 = 8$ Year 2 In year 2 children to show link between repeated addition and multiplication using key vocabulary. e.g. $2 + 2 + 2 + 2 = 8$ $4 \times 2 = 8$

Arrays		
Concrete	Pictorial	Abstract
Children to make arrays with concrete materials.    Stem sentences: There are _____ columns. There are _____ in each column. There are _____ altogether. There are _____ rows. There are _____ in each row. There are _____ altogether.	 Stem sentences: There are _____ columns. There are _____ rows. There are _____ altogether. There are _____ rows. There are _____ in each row. There are _____ altogether.	Children to move to show repeated addition: 2 + 2 + 2 + 2 = 8 4 + 4 = 8 <u>Year 2</u> In year 2 children to investigate commutative law in more detail and represent this with multiplication. 2 + 2 + 2 + 2 = 8 4 + 4 = 8 4 x 2 = 8 2 x 4 = 8

Year 3

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

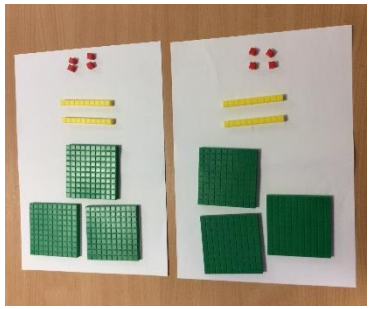
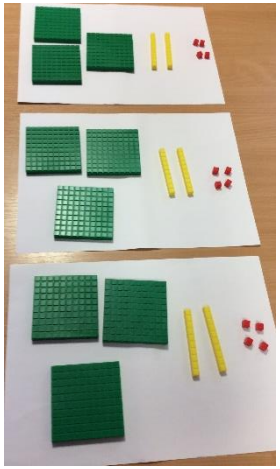
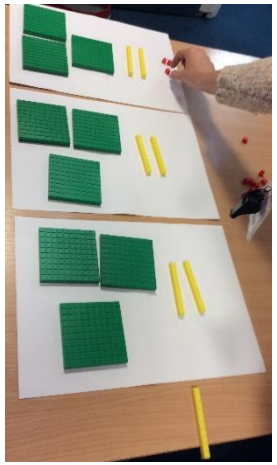
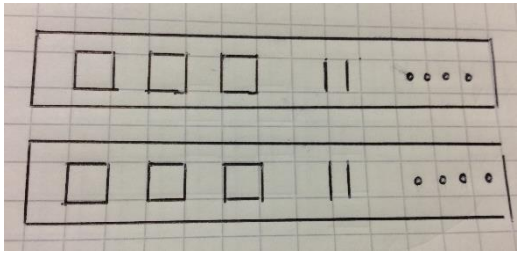
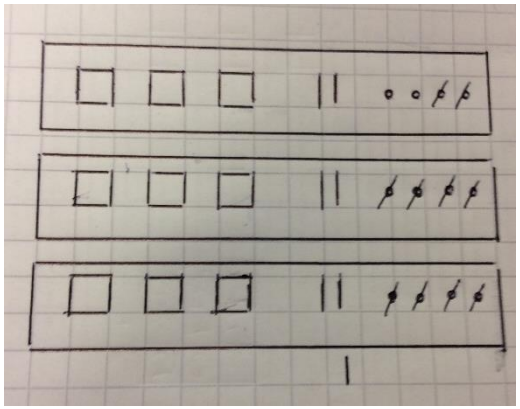
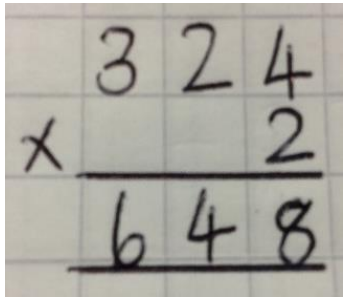
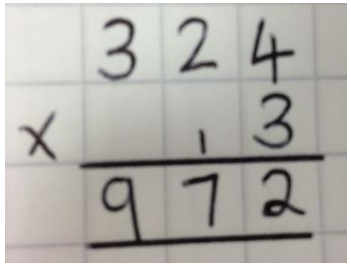
Short multiplication 2 digit by 1 digit (extended version)

Concrete	Pictorial	Abstract
Children to use dienes to find answers to multiplication involving 2 digit by 1 digit. 3 x 34 = 	Children can use simple pictures to find the answer. 	 Children to begin by partitioning number into tens and ones, multiplying them separately and then adding answers together. Stem sentences: First multiply the ones. Then multiply the tens. Finally add answers. When children are confident with this they are then to look at layout of column. Children to use extended version in year 3. 

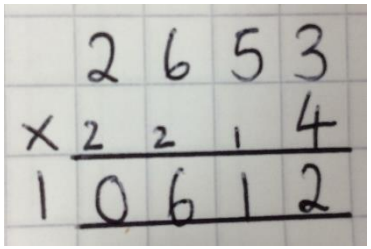
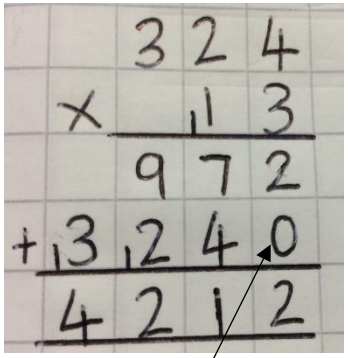
Year 4

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

Short multiplication (3 digit x 1 digit)

Concrete	Pictorial	Abstract
   Recap and build on year 3.	  Simple pictures will be used as a visual way of representing the method.	  Children will then move on to structure their working out into the formal method of short multiplication.

Year 5
Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
Year 6
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the efficient written method of long multiplication

Short multiplication (4 digit x 1 digit)		
Concrete	Pictorial	Abstract
Recap year 4 if needed (see year 4).	Children will recap what they have learnt in year 4. Simple pictures will be used as a visual way of representing the method (see year 4).	 Children will mostly work with the abstract in years 5 and 6 and will use their understanding from previous years to add an extra digits (see year 4 for method).
Long multiplication (4 digit x 2 digit)		
Concrete	Pictorial	Abstract
		 Children will use their understanding of short multiplication to progress to long multiplication. They will be shown how using their knowledge of other facts can support them when multiplying with multiples of 10 e.g: 126 x 1 = 126 126 x 10 = 1260 132 x 2 = 264 132 x 20 = 2640

Division

dividend ÷ divisor = quotient

Key vocabulary to be used from Year 2.

Year 1

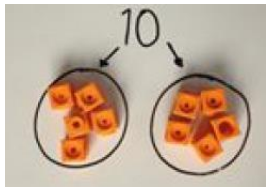
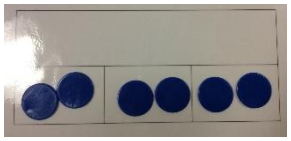
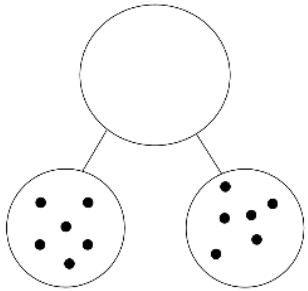
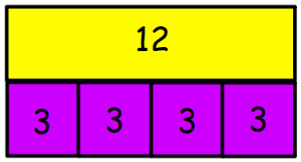
Solve simple one step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

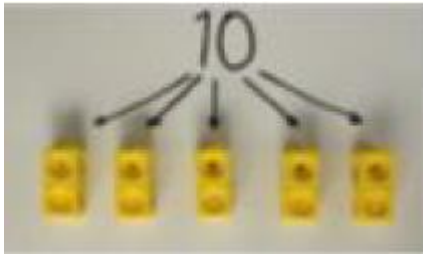
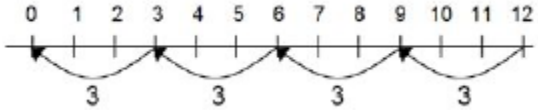
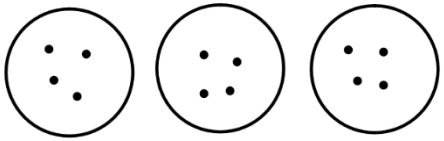
Year 2

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

Show that multiplications of two numbers can be done in any order (commutative) and division of one number by another cannot

Sharing objects equally

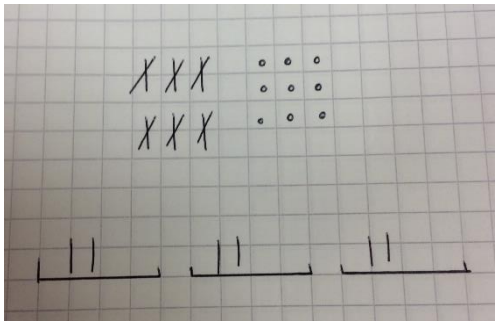
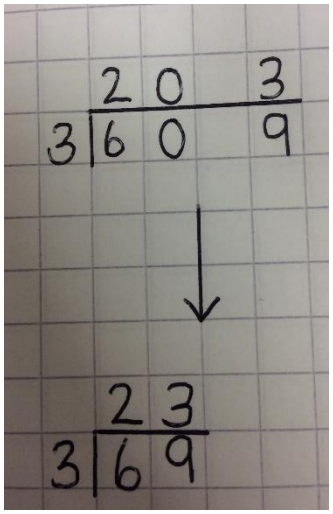
Concrete	Pictorial	Abstract
Children to physically share objects into equal groups.   Bar model to be used more in Year 2. 	Children to use pictorial methods to share into equal groups.  Bar model to be used more in Year 2.  	6 shared equally between 2 is 3. Year 2 Children to show this using division with key vocabulary. Children to understand division can't be done in any order like multiplication. 6 ÷ 2 = 3

Division as grouping		
Concrete	Pictorial	Abstract
Children to physically group objects.    How many groups of ___ can you make?	Children to use pictorial methods to show grouping.   	There are ____ equal groups of ____. <u>Year 2</u> Children to show this using division with key vocabulary. 10 ÷ 2 = 5

Year 3

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

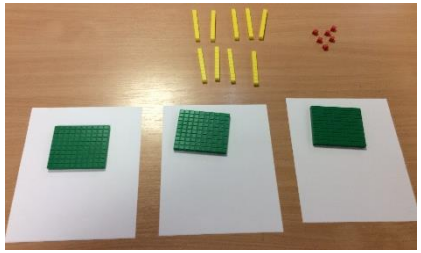
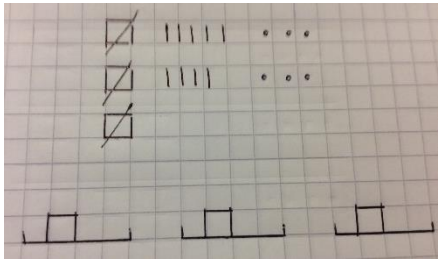
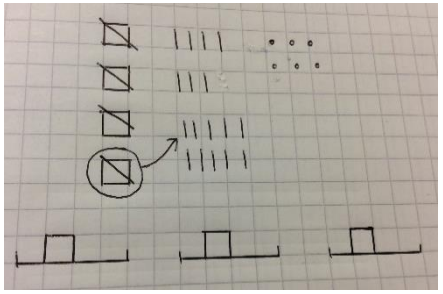
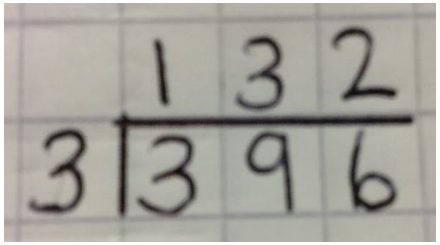
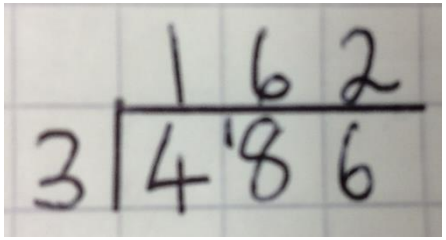
Divide 2 digits by 1 digit

Concrete	Pictorial	Abstract
Children to practically divide numbers using concrete materials.  	This can be shown in a simple picture. 	Children to begin with extended version before moving to short division. 

Year 4

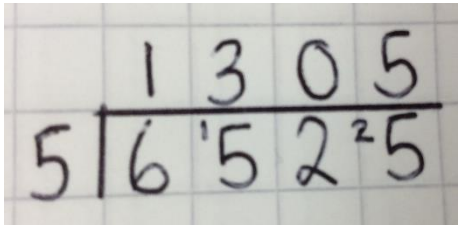
Divide two-digit and three-digit numbers by a one-digit number using formal written layout.

Short division (Divide 2/3 digits by 1 digit)

Concrete	Pictorial	Abstract
 Children will recap learning from year 3 practically and move to working with 3 digits.	  Children will then move to represent their working out with simple pictures.	  Children will then use short division to work out calculations.

Year 5
Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
Year 6
Divide numbers up to 4 digits by a two-digit whole 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

Short division

Concrete	Pictorial	Abstract
Children to recap learning from year 4 (see year 4 example).	Children to recap learning from year 4 (see year 4 example). Children should be confident in years 5 and 6 using simple pictures to answer calculations.	 Children will using short division to complete calculations with up to 4 digits.
		Year 6 will use short division to also divide by 2 digits.