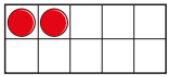
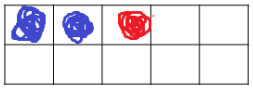
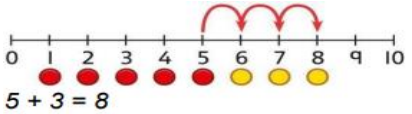
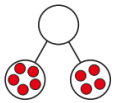
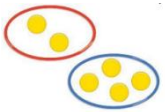
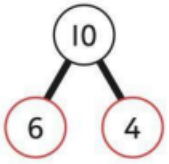
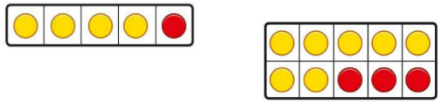
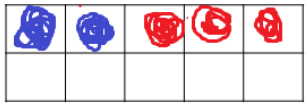
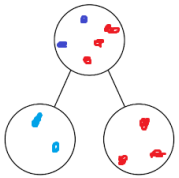
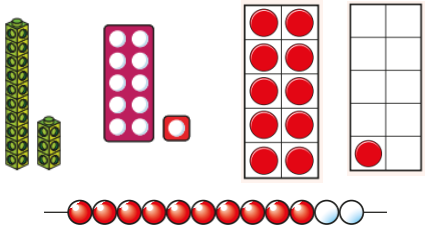
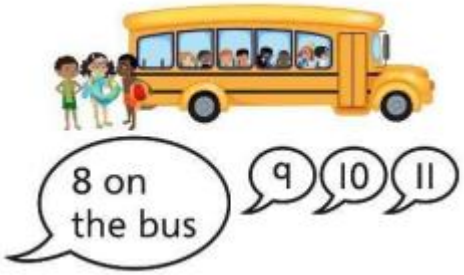
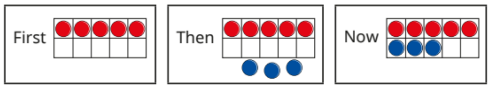
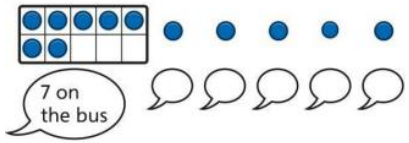
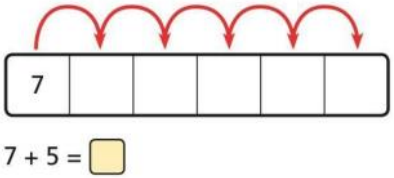
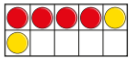
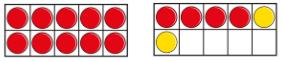
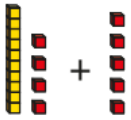
KINGMOOR NURSERY & INFANT SCHOOL CALCULATION POLICY

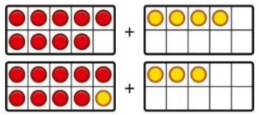
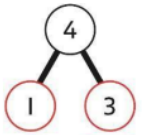
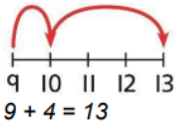
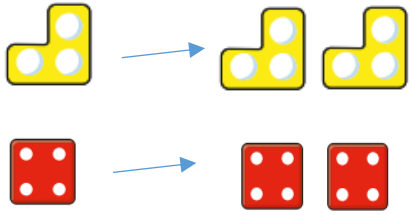
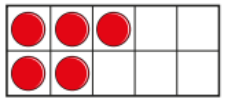
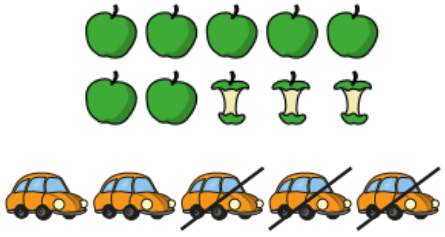
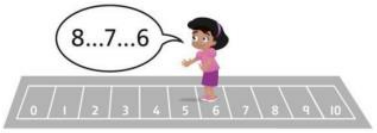
KS1 – ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION

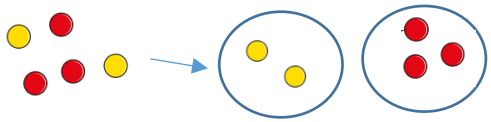
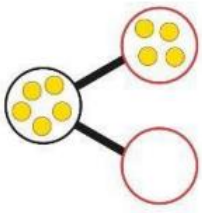
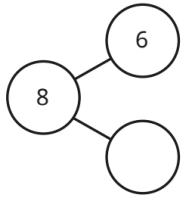
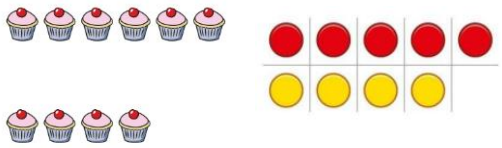
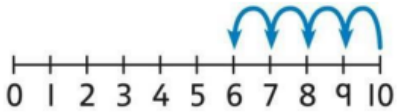
Kingmoor Nursery and Infant School Calculation Policy 2024

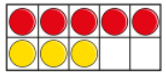
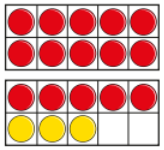
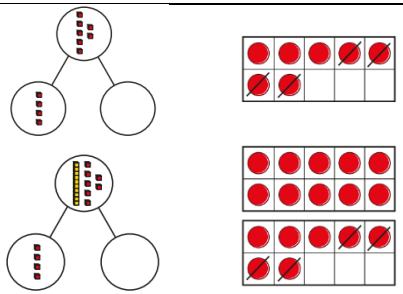
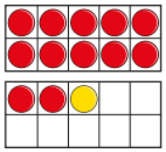
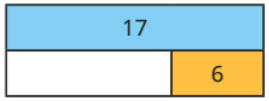
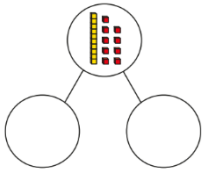
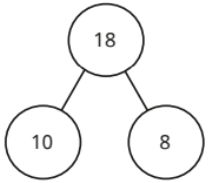
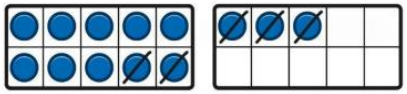
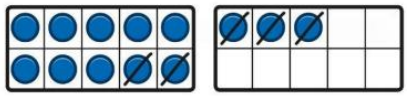
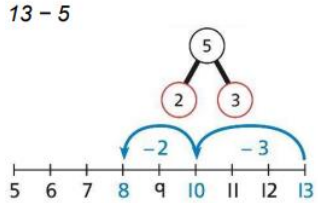
Year 1 Addition objectives	Concrete	Pictorial	Abstract
Counting and adding more	Practically add more objects to a group to find the total. One more than 4 is 5.  There are 6 beads, now push 2 more. How many now?  Counting on using a tens frame 	Use first, then and now stories to match pictures.  Draw pictorial representations to match concrete representations. / first, now and then stories. 	Introduce addition calculations to match concrete and pictorial representations. **4 + 1 = 5** Use a number line to link counting on with finding one more. **One more than 6 is 7, 7 is one more than 6.**  Count on a number line by adding more than one.  *5 + 3 = 8*
Part-whole relationships	Sort people and objects into parts and understand the relationship with the whole.  *The parts are 2 and 4. The whole is 6.* They represent this using a part-whole model**.** 	Children explore and describe pictorial representations showing parts and wholes.  They draw their own pictorial representations including in part-whole models. 	Children build on knowledge of the part-whole model and represent this using numerals.  6 + 4 = 10 *6 + 4 = 10*

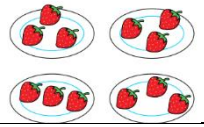
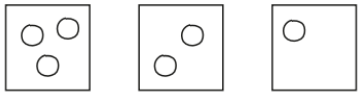
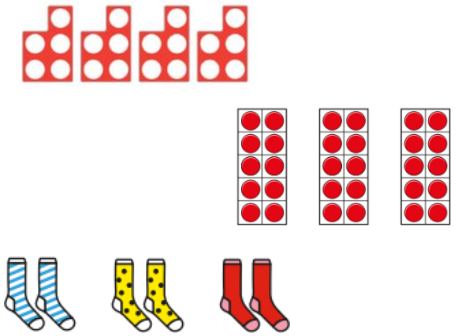
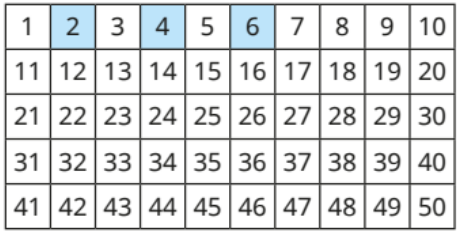
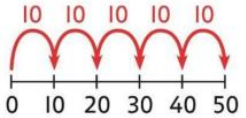
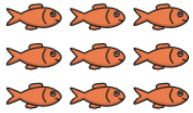
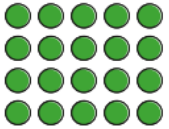
Knowing and finding number bonds within 10	Break apart a group and put it back together to find and form number bonds.  Use 5 and 10 frames to represent bonds.  Use rekenreks to represent bonds.  Pupils explore bonds systematically initially.	Draw pictorial representations of bonds using tens frames / part-whole models,  	Children build on their knowledge from representations used and show this in numerals.. Some examples should include 0. Pupils should use their knowledge of bonds to work out missing parts and wholes. 5 + 4 = 9 
Understand teen numbers as ten and some more	Children complete a group of ten items and add more to make teen numbers. i.e. 11 is ten and 1 more. 	Pupils understand and draw pictorial representations of teen numbers. 	Pupils understand that 1 ten and 3 ones equals 13 So **10 + 3 = 10**

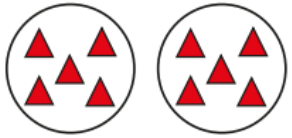
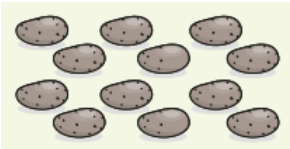
Adding by counting on	Children use knowledge of counting to 20 to count on using people or objects.  Children complete number stories.  They use counters to support their counting on strategy.	Pupils draw pictorial representations of tens frames to help them count on.  Pupils may draw their own simple bar-models to count on; 13 and 5 more.  	Children use number lines and number tracks to support them with counting on.  9 + 6 = _____ 
Adding the ones using number bonds.	Children use bead strings / tens frames / base 10 to recognise how to add ones to find the total effectively.  2 + 3 = 5 12 + 3 = 15  4 + 2 = _____  14 + 2 = _____	Children draw their own pictorial representations of concrete manipulatives used.  4 + 5 = _____  14 + 5 = _____	Children recognise that a teen is made from a ten and ones. They use their knowledge of addition within ten to work efficiently. *3 + 5 = 8* *So, 13 + 5 = 18* They use this knowledge to support them with number bonds to 20 i.e. **7 + 3 = 10 so 17 + 3 = 20.**

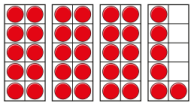
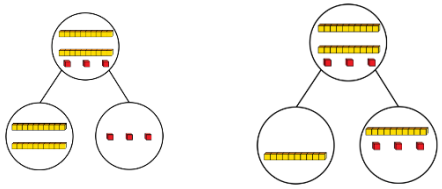
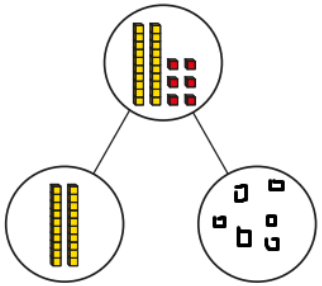
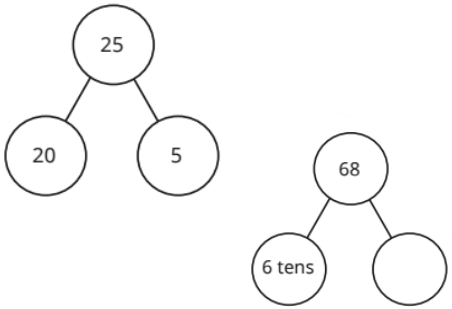
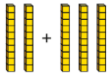
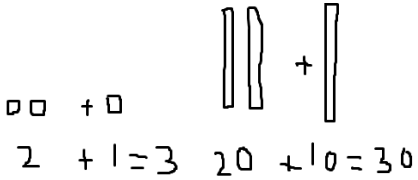
Bridging the tens using number bonds	Children use a bead string to complete ten and understand how it relates to addition i.e. **8 and 2 makes 10 so 8 and 5 is 10 and**  **3 more.**	Children draw on knowledge from equipment and draw pictures. **9 plus 4 is the same as 10 plus 3 more** 	Children use the part-whole model and number line to support the calculation.  
Understanding doubles	Children use equipment to represent and identify doubles; 	Pupils draw pictures to model their understanding; including drawing counters on tens frames. 	Pupils recall doubles using calculations i.e. **2+2=4** **3+3=6** They double larger numbers when confident.
Year 1 Subtraction objectives	**Concrete**	**Pictorial**	**Abstract**
Counting backwards and taking away	Children arrange objects / counters and take some away to find out how many left. 1 less than 6 is 5. One less than 3 is 2. 	Children draw and cross out objects to take them away. They draw pictures to represent problems or make up stories to match pictorial representations. 	Children count back on a number track / number line to take away. Children understand the calculation 9 – 3 = 6 

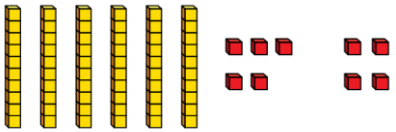
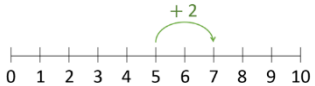
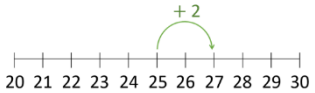
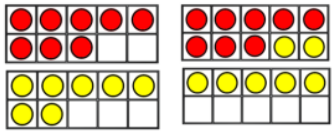
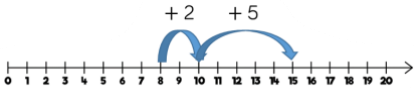
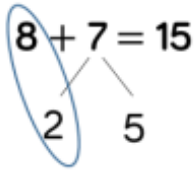
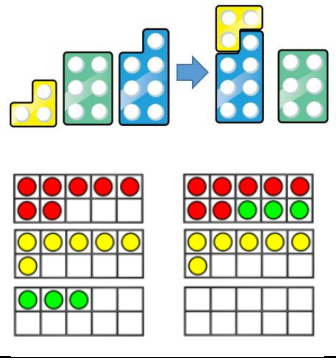
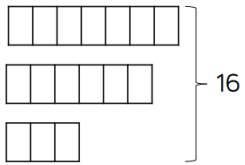
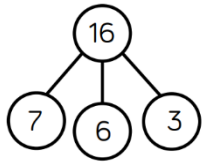
Finding a missing part, given a whole and a part.	Children split a whole into two parts and understand how one part can be taken away to make the other part. **5 – 2 = 3**  From part-whole models, children quickly recognise the relationship of addition and subtraction.	Children draw or complete pictorial part whole models to find a missing part.  5 – 4 = ____ They identify parts and wholes from pictorial representations. 	Children use the part-whole model to support subtraction. They derive this from pictorial representations and concrete materials.  8 – 6 = ____ Pupils can identify key fact families; 8 – 6 = 2 2 + 6 = 8 8 – 2 = 6 6 + 2 = 8
Finding the difference	Pupils arrange objects so that the difference can be clearly seen. Use counters and tens frames or rekenreks. 	Pupils draw pictorial representations of objects.  The difference between 5 and 2 is 3.	Children understand difference as subtraction and use a number line. **10 - ____ = 6** 
Subtraction within 20 (using number bonds)	Children use their knowledge of number bonds to help them subtract efficiently. Using tens frames and base 10, children notice the second subtraction is ten more.	Children become familiar with pictorial representations of equipment. They complete part-whole models or cross out counters on tens frames.	Children identify patterns in formal calculations. **5 – 2 = 3** **so** **15 – 2 = 13**

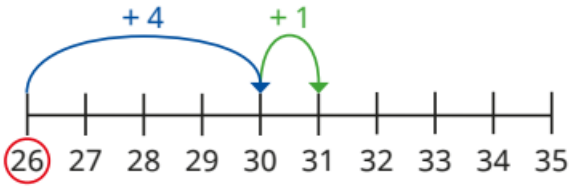
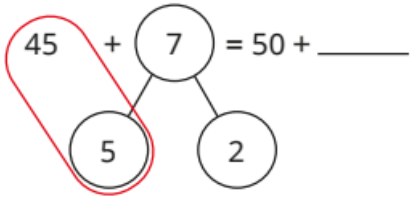
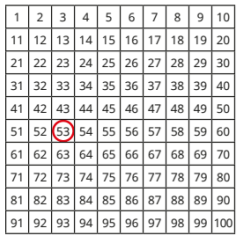
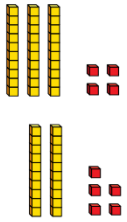
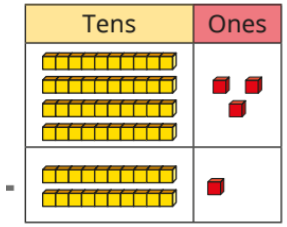
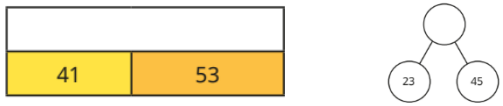
	  **8 – 3 = 5** **18 – 3 = 5**		
Recognising inverse operations	Practically explore tens frames and base 10 in part-whole models to identify inverse relationships between addition and subtraction. **13 – 1 = ____** **12 + 1 = ____** 	Pupils draw / become familiar with pictorial representations. Bar model;  Part-whole model 	Pupils write fact families from pictorial and concrete representations. They notice patterns.  **10 + 8 = 18** **8 + 10 = 18** **18 – 10 = 8** **18 – 8 = 10**
Bridging ten under number bonds	Children see how they bridge ten to subtract on a tens frame. For example; 13 – 5 =  13 subtract 3 to get a full 10. Subtract another 2.	Children draw representations to show this.. They become familiar with crossing out counters on a tens frame. 	Pupils use a number line and part-whole model to help them to subtract. 

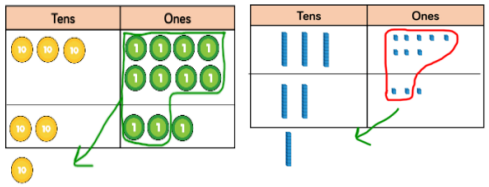
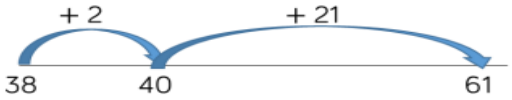
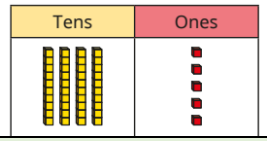
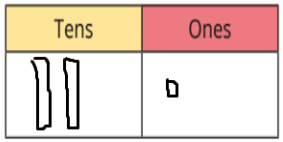
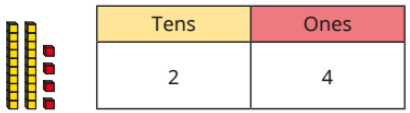
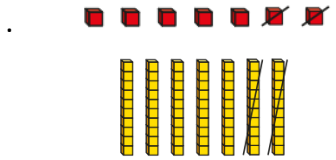
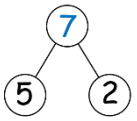
Year 1 multiplication objectives	Concrete	Pictorial	Abstract
Equal and unequal groups	Pupils arrange real life objects into groups. They recognise whether they are equal or not. 	Children are familiar with pictorial representations. They draw and represent equal and unequal groups. 	Pupils describe equal groups that they draw / build. **There are 3 equal groups of 4** **There are 4 equal groups of 3.**
Finding the total of equal groups Counting in 2s, 5s and 10s	Pupils build representations of 2s, 5s and 10s using real objects and concrete maths equipment. 	Children identify patterns on 100 squares. They become familiar with pictorial representatons of concrete equipment.  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	Pupils use number lines to support counting in 5s, 2s and 10s. This supports understanding of repeated addition. Pupils also derive repeated addition from pictorial and concrete representations.  10 10 10 10 10 0 10 20 30 40 50 **10 + 10 + 10 + 10 + 10 = 50**
Making arrays	Pupils have the opportunity to build their own arrays using equipment and counters. They describe rows and columns. 	Children are familiar with a range of pictorial representations of arrays. They draw their own with rows and columns. 	Children represent arrays with repeated addition calculations to describe rows and columns. 5 + 5 + 5 + 5 = 20 4 + 4 + 4 + 4 + 4 = 20 

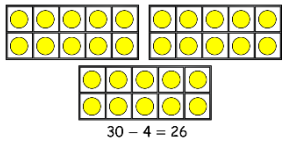
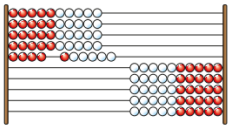
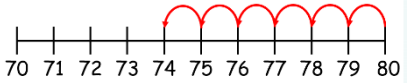
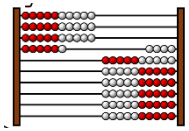
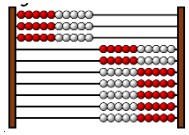
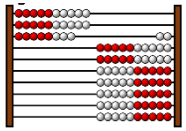
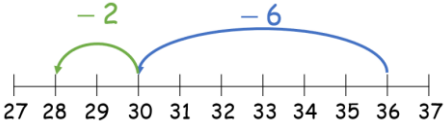
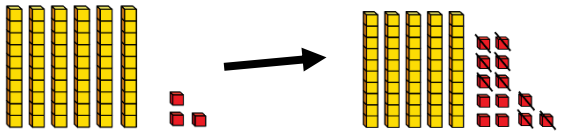
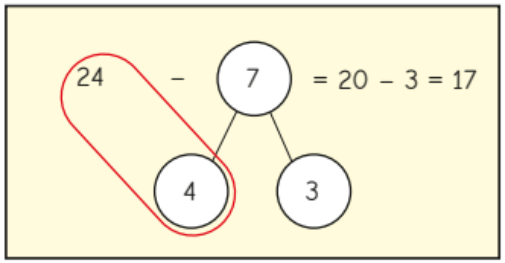
Year 1 division objectives	Concrete	Pictorial	Abstract
Making equal groups	Children learn to split the whole into equal groups of 2, 3, 5 and 10. They do this with people and objects.  There are 15 triangles altogether. There are 5 in each group. There are 3 groups.	Children draw hoops around pictorial representations or draw their own equal groupings. **There are 2 equal groups of 5** 	Children begin to recognise links between equal groups and counting in 2s, 5s and 10s and doubles. For example, **knowing that there are 3 tens in 30.**
Sharing equally	Children share real objects into equal groups / into boxes / on plates. 	Children draw pictures to share objects into groups. They may cross pictures of items as they go or draw lines to share. 	Children use their knowledge of counting in multiples to know how larger numbers can be shared equally. For example; **Knowing 10 shared into 2 groups is 5 because there are 2 fives in 10.**

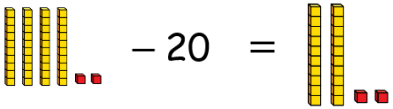
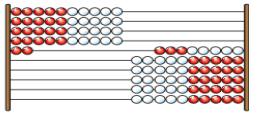
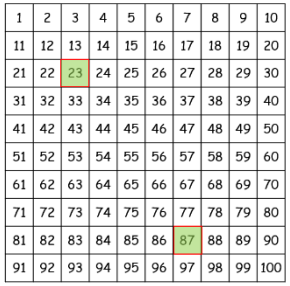
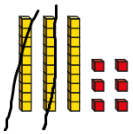
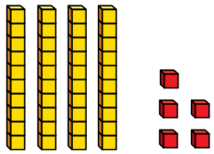
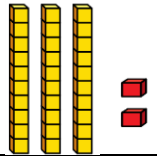
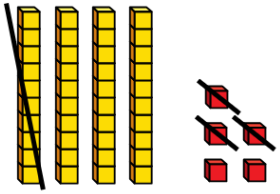
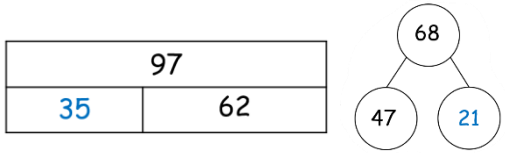
Year 2 Addition objectives	Concrete	Pictorial	Abstract
Understanding tens and ones	Pupils represent numbers to 100 using a range of equipment.  Partition numbers to 100 into tens and ones first. Then partition numbers in different ways. 	Children draw pictorial representations to show tens and ones. 	Children write numbers to represent the number of tens and ones. 
Adding tens	Children use Base 10 equipment. They use knowledge of adding ones to add tens.  _____ ones + _____ ones = _____ ones _____ + _____ = _____  _____ tens + _____ tens = _____ tens _____ + _____ = _____	Children draw pictorial representations of ones and tens.  	Children are able to complete abstract calculations using number bond knowledge. 4 + 5 = _____ 40 + 50 = _____

Adding a one digit number to a 2-digit number (not bridging ten)	Children use Base 10 to represent addition of 2-digit numbers.  65 + 4	Children draw jumps on number lines to understand how adding ones can help.  5 + 2 = 7  25 + 2 = 27	Pupils use their knowledge of bonds within 10 to add one digit and 2-digit numbers. 25 + 2 = 27 35 + 2 = 37 We know this because 5 + 2 = 7.
Add by making ten	Children solve addition practically by making ten i.e. 8 + 7 = 10 + 5 	Children use pictorial methods such as number lines to partition numbers and bridge to 10 i.e. 8 + 7 = 	Children know that 8 + 2 = 10 so 10 + 5 is 15. 
Adding 3 one digit numbers.	Use numicon / tens frames to represent addition. Children are encouraged to look for bonds to 10 or doubles. 	Children may draw bar models / use part whole models to represent addition.   	Children can see bonds to ten in the abstract form. 7 + 6 + 3 = 16 If 7 + 3 = 10 10 + 6 = 16

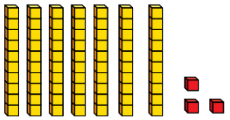
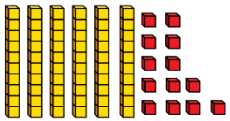
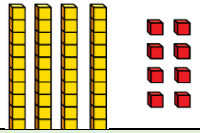
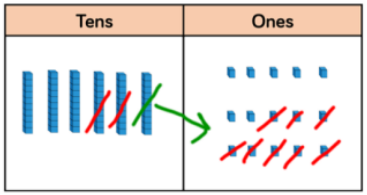
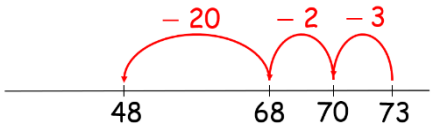
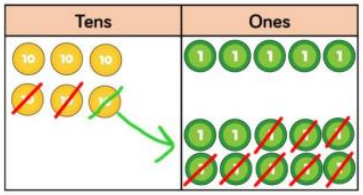
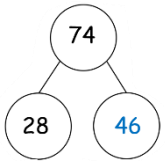
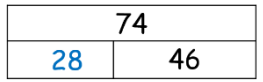
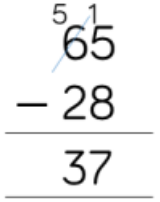
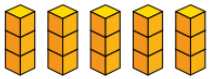
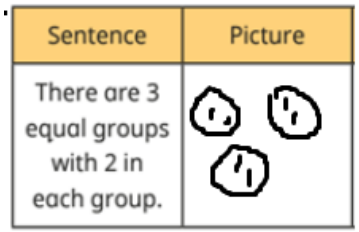
Adding a one digit number to a 2-digit number (bridging ten)	Children bridge across ten using base 10 equipment. They build the calculation. i.e. 38 + 5 = 40 + 3 	Pupils use a number line to represent bridging through ten i.e. 26 + 5 = 30 + 1 	Children solve the calculation by knowing 45 + 5 more is 50. They then add 2 more.  **50 + 2 = 52**
Adding a multiple of ten to a 2-digit number	Children find ten more practically. They then add more than one ten.  Children build a number on a rekenrek and then add ten more.	Children identify 10 or tens more using a 50 grid. 	Pupils use knowledge of place value to add tens i.e. **24 + 20 =** **20 + 20 = 40** **40 + 2 = 42**
Adding two 2 digit numbers (not crossing ten)	Children use base 10 equipment to work out addition. Children should always add ones first.  There are 9 ones altogether. There are 5 tens altogether. 5 tens and 9 ones is 59	Children may draw pictures in place value grids to represent addition;  Represent addition using part-whole models and bar models. 	Children use knowledge of place value to add. They always start with the ones. 32 + 26= 2 + 6 = 8 30 + 20 = 50 =58 Children start to use column method. 8 3 + 1 3 _____

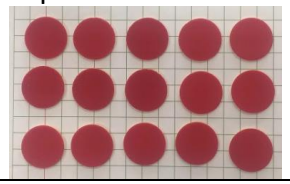
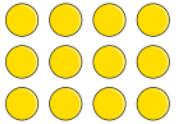
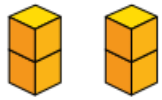
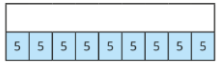
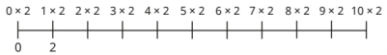
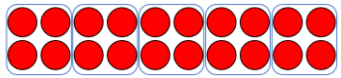
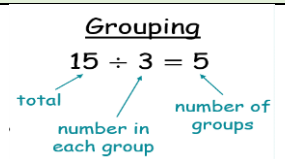
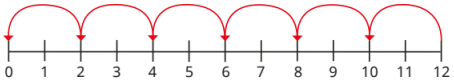
Adding two 2 digit numbers (crossing ten)	Use practical equipment to make exchanges. They may use base 10 / place value counters. 	Use a blank number line to count on to find the total.  Chhildren draw pictorial representations of equipment used practically.	Pupils add ones first then tens. 64 + 28= 4 ones + 8 ones = 12 ones 12 ones = 1 ten and 2 ones 6 tens + 2 tens + 1 ten = 9 tens 9 tens + 1 ones = 92 Then column method; 38 + 23 61 1
Place Value Charts	The place value of numbers are represented on a place value chart using equipment 	Pupils draw pictures to represent equipment. 	Pupils use numerals on the chart. 
Year 2 Subtraction Objectives	**Concrete**	**Pictorial**	**Abstract**
Related facts	Children use concrete resources such as Base 10 to subtract  **If 7 – 2 = 5** **70 – 20 = 50**	Children represent related facts by drawing equipment and crossing out.  3 – 1 = 2 30 – 10 = 20	Children represent this with bar models and part-whole models.  5 + 2 = 7 50 + 20 = 70 70 = 50 + 20 70 = 20 + 50  **4 + 5 = 9** **40 + 50 = 90**

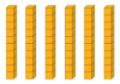
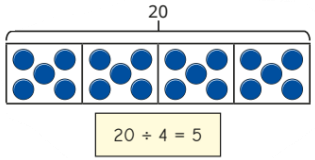
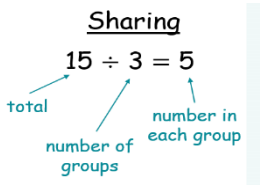
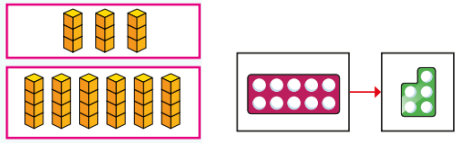
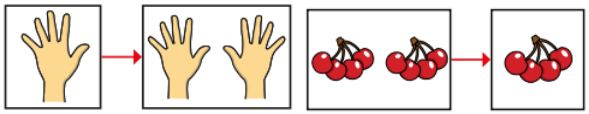
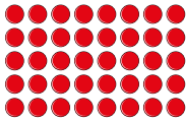
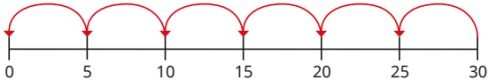
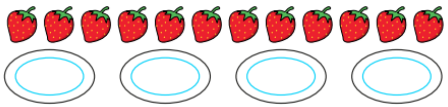
Subtract from a ten.	Children use tens frames and counters to recognise patterns when subtracting from a tens number.  30 – 4 = 26 10 – 4 = 6 20 – 4 = 16 30 – 4 = 26 Children use rekenreks to represent subtraction i.e. 50 – 6 = 	For larger numbers, children use number lines to subtract.  70 71 72 73 74 75 76 77 78 79 80 80 – 4 = 76	Use knowledge of bonds to 10 to subtract. **i.e. 50 – 6** **If 6 + 4 = 10** **Then 10 – 6 = 4** **So 50 – 6 = 44**
Subtracting a 1 digit number from a 2 digit number (bridging ten)	Base 10, rekenreks support children with partitioning numbers. 36 – 8 =  Build 36  Subtract 6 to get to 30  Then subtract 2 more to get 28	Children use number lines to bridge back to ten to subtract. i.e. 36 – 8 Subtract 6 to get 30 then 2 more.  – 2 – 6 27 28 29 30 31 32 33 34 35 36 37 Draw representations of Base 10. Exchange one ten for ten ones then cross out. i.e. 63 - 9 	Children partition the number they are subtracting. They bridge back to ten then subtract the rest.  24 – 7 = 20 – 3 = 17 4 3

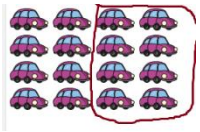
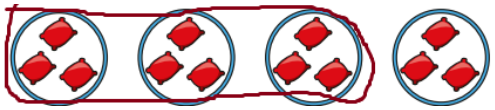
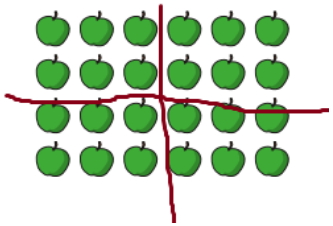
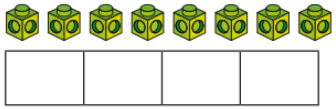
Subtracting a multiple of ten.	Base 10 and rekenreks are used. Children learn to subtract tens practically. They don't need to subtract any ones. 42 – 20 = 22   Children subtract whole rows of ten on a rekenrek.	Subtract on a 100 square by moving up and down i.e. for 23 – 20, go up two places.  Children draw pictorial representations of base 10 and then cross out to subtract.  36 – 20 = 16	Children know to subtract tens only i.e. to subtract 20 you take 2 tens away. **47 – 30 =** **They do 40 – 30 = 10** **17**
Subtracting two 2 digit numbers (not crossing ten)	Children use manipulatives to represent subtraction. They start by subtracting ones. **45 – 13 =**  Build 45, subtract 3 and then 2 tens. 	Children draw and cross out pictorial representations. **5 ones – 3 ones = 2 ones** **4 tens – 1 ten = 3 tens** **32**  45 – 13 = 32	Bar models and part-whole models are used. They mentally subtract ones then tens. Children may begin to use a formal column method.   3 4 – 1 2 2 2

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

Subtracting two 2-digit numbers (crossing ten)	Base 10 is used to support children to make exchanges and explain why they need to make an exchange. i.e. 73 – 25  You can't so 3 – 5. Swap a ten for 10 ones.  Practically subtract. 	Draw equipment and cross out to subtract. They may use a number line to support.   	Bar models and part-whole models are used to represent parts and wholes.   Use column method as an efficient way. 
Year 2 Multiplication objectives	**Concrete**	**Pictorial**	**Abstract**
Multiplication sentences	Children represent multiplication using equipment. The understand this as;  **5 lots of 3** **5 equal groups of 3** They match representations with repeated addition and multiplication sentences i.e.  **2 + 2 + 2** **3 x 2**	Children draw their own representations of equal groups, repeated addition and multiplication sentences. 	Children draw on their understanding of 'groups of' and 'lots of' and write calculations; **4 lots of 5** **5 + 5 + 5 + 5** **4 x 5**

Arrays	Children use equipment build arrays to match repeated addition and multiplication calculations. 	Children draw their own arrays to match multiplication sentences and repeated addition. 	Children write both calculations to match given pictorial representations of arrays.  4 x 3 = 3 x 4 =
The 2, 5 and 10 x table	Practical representations show x tables and manipulatives are used to support understanding.  	Understand which calculation pictorial representations represent.   Answer multiplication calculations using number lines and bar models. They count on in 2's, 5's and 10's. 	For 2 x table, use link with doubling. 4 × 2 = _____ For 5 and 10 x table, use efficient counting strategies, children spot patterns and see links between them. 2 × 5 = _____ × 10 5 × 8 = _____ × 10
Year 2 Division objectives	**Concrete**	**Pictorial**	**Abstract**
Making equal groups - grouping	Practically arrange counters into equal groups. Division is seen as grouping. Discuss the meaning of each number in the division calculation.  **2 equal groups of 3** **6 ÷ 2 = 3**	Draw around pictorial representations to group.  **5 equal groups of 4** **20 ÷ 5 = 4** Children may also draw their own representations.	 Use a number line to identify equal groups.  12 is made up of _____ equal groups of _____ 12 ÷ 2 = _____

Sharing	Use concrete resources to physically share between groups.  **15 shared between 3 equal groups** **15÷3 = 5** Use Base 10 for higher numbers. 60 ÷ 3 = 20 	Bar models and pictures are used to support with completing calculations. They draw pictures to share. 	Notice key differences between sharing and grouping. Begin to use knowledge of multiplication to divide. 
Doubling and Halving	Use concrete resources to show half and double. 	Understand and say which pictures represent half and double. 	Write a multiplication calculation to represent halving and doubling. **Double 3 = 2 x 3** **Half of 6 = 6 ÷ 2**
Divide by 2, 5 and 10	Concrete resources support for working out division i.e. counters, base 10. They derive x and ÷ calculations.  **3 x 2 = 6** **6 ÷3 = 2**  **5 x 8 = 40** **40 ÷ 5 = 8**	Numberlines and bar models are used.  30 ÷ 5 = 6	Children are aware that they can use their x tables to support them with dividing. **25 ÷ 5 = 5** **5 x 5 = 25**
Fractions	**Concrete**	**Pictorial**	**Abstract**
Unit fractions – ½, ¼, 1/3	Children share practically to find ¼,  1/3, or ½ of an amount.	Children draw pictorial representations of sharing. 	Children half and then half again to find a quarter. i.e. **¼ of 24 =** **½ of 24 = 12**

	They may use cubes, multilink and base 10 for larger quantities.	Children circle equal groups on pictorial representations to find a fraction. i.e.  ½ of 16 is 8	**½ of 12 = 6** **So ¼ of 24 is 6**
Non-unit fractions - 2/3, 2/4, ¾	Share objects practically. Count more than one group. ¾ of 12 = 9 	Draw groups to represent fractions. i.e. for ¾ have 4 groups and count 3. ¾ of 24 = 18  Share into a bar model. 	Children recognise equivalence of ½ and 2/4. **½ of 6 is 3** **2/4 of 6 is 3** They learn that they larger the numerator, the bigger the part is. i.e. ¾ is larger than 2/4.