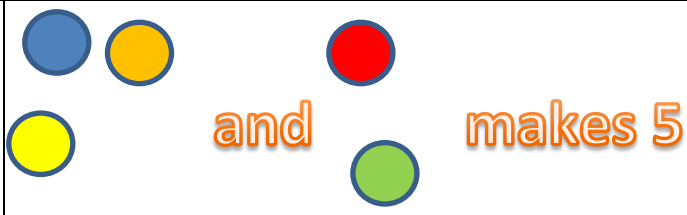
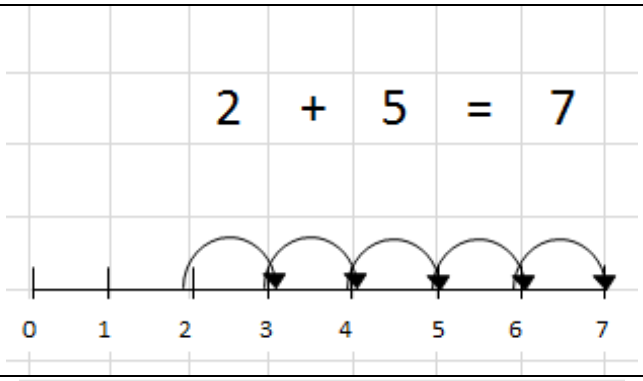
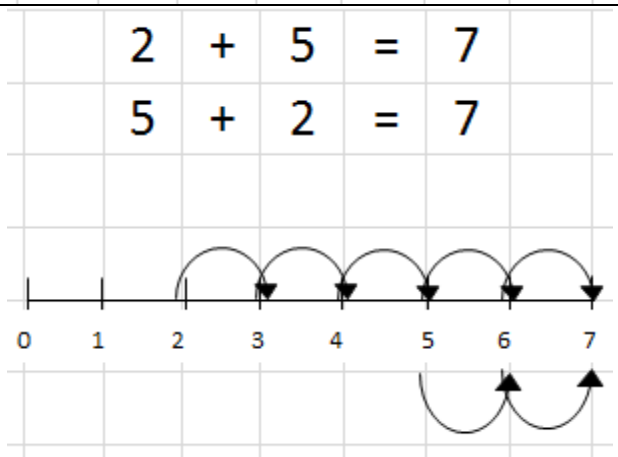
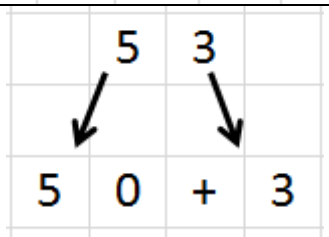
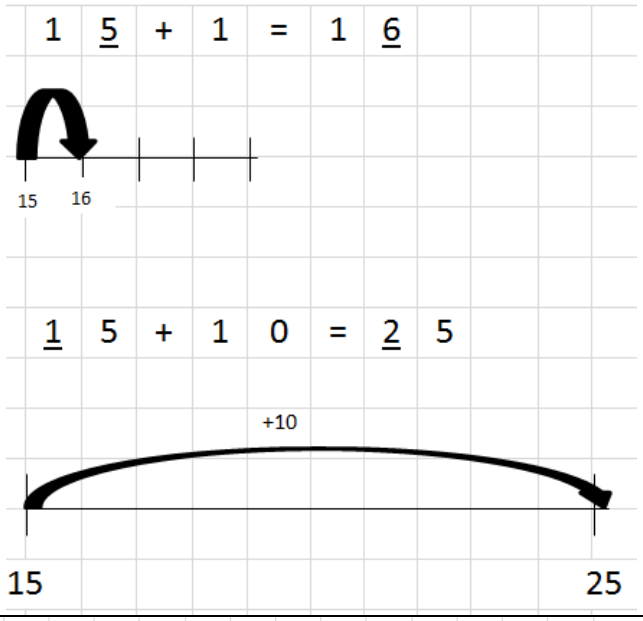
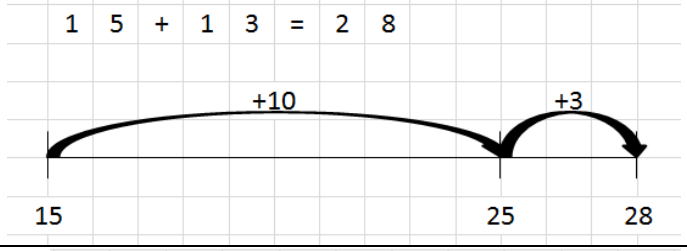
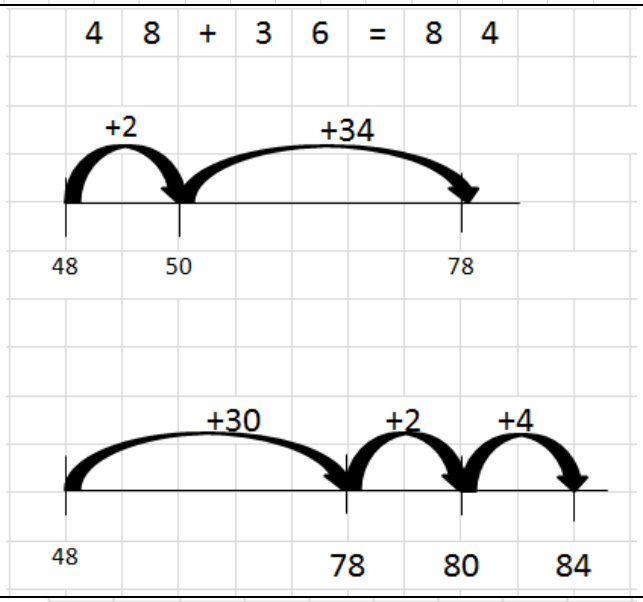
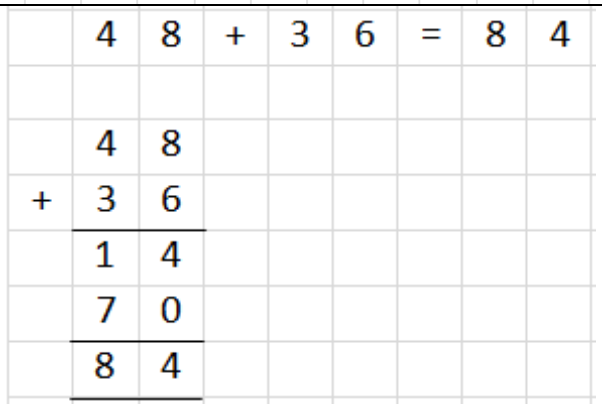
Addition

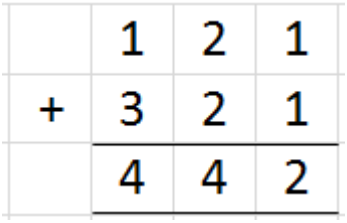
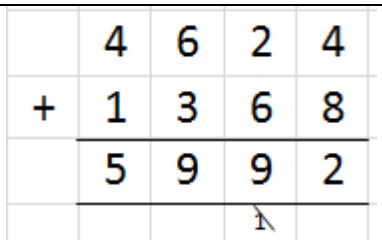
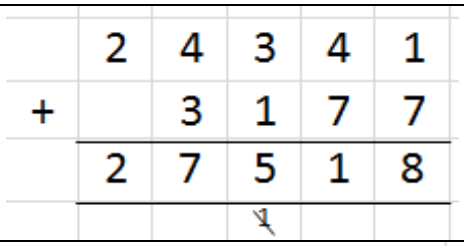
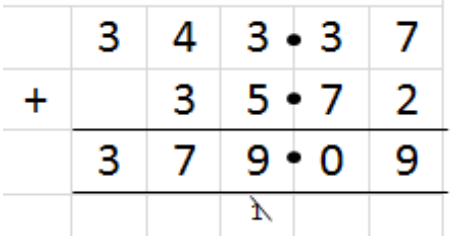
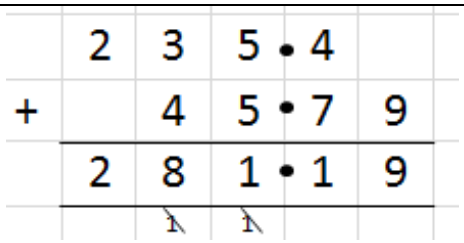
By the end of the Foundation Stage children are expected to confidently, consistently and independently do the following before moving on to the schools formal calculation policy:

- Count reliably with numbers from 1 to 20.
- Place them in order.
- Say one more than a given number.
- Add two single digit numbers.

Count forwards from any given number up to 20 (e.g. count on 3 more than 6).

Stage	Working	Vocabulary
Begin to recognise addition by combining groups of objects together.		Counting each group. Combining and counting all together starting at one.
Count along a number line to add numbers together. Use + and = notations to record calculations).		Value of each number. 2 units + 5 units = 7 units etc.
Addition by counting on. Recognising that the answer will be greater. Recognising that addition can be done in any order.		Value of each number. 2 units + 5 units = 7 units etc.
Partitioning numbers in preparation for adding.		Recognising that numbers can be represented in different ways. 53 = 50 + 3. 5 10s and 3 units.

Know which digit changes when adding 1s or 10s.		Recognising the value of each digit. 15 = 10 + 5. 15 + 1 unit = 16. 16 = 10 and 6 units. 15 plus 10. The number in the tens column will change. 15 + 10 = 25. The number in the 10s column increases.
Adding two digit numbers by partitioning. Adding tens first and then units. Biggest number first and counting on.		15 goes first. 13 is the same as 10 + 3. Add 10 first. 15 + 10 = 25. 3 units left to add. 25 + 3 = 38.
Adding two digit numbers using a number line. Children can partition numbers recognising that 36 can be represented in a number of different ways (e.g. 2 =34 or 30+2+4), added differently but the result will be the same.		Add 2 first to jump to next 10 (50). Recognise that there are 34 left to add (34 +2 – 36).There is 34 left to add. Next jump of 34 to 78. Or, Add tens first. 36 has 3 tens or 30. 48 add 30 become 78. Next jump of 2 to reach next 10 (80). 4 left to add, next jumpt to 84.
Expanded method using columns. Recognise place value of digits, adding units first and then tens. Adding by partitioning allows children to recognise the place value of each digit. Children recognise that 8 + 6 = 14 and must be written in two columns.		Units added first. 8 + 6 = 14. 14 is greater than 10. 1 in tens columns, 4 in units. Second step is 40+30. Language recognised that ‘4’ is worth ‘40’ and 3 is worth ‘30’.

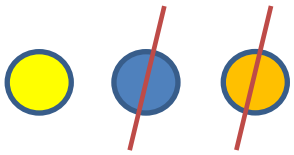
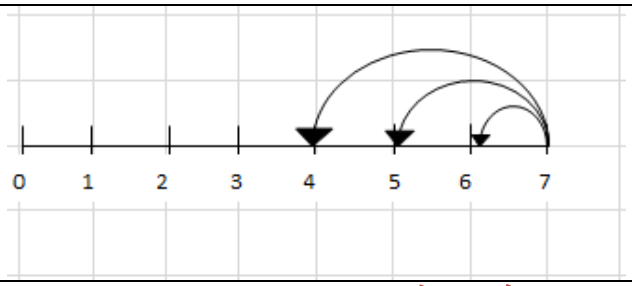
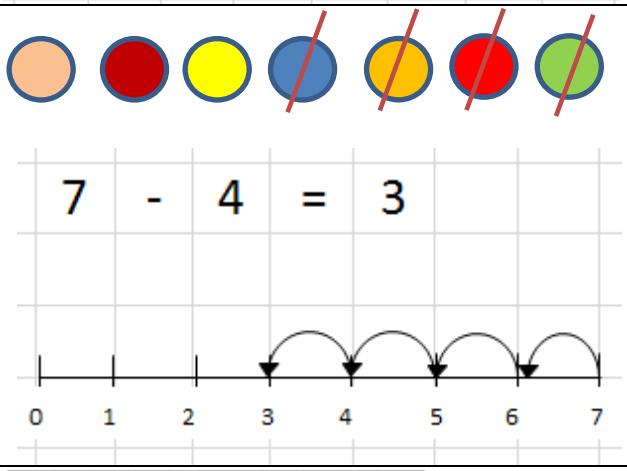
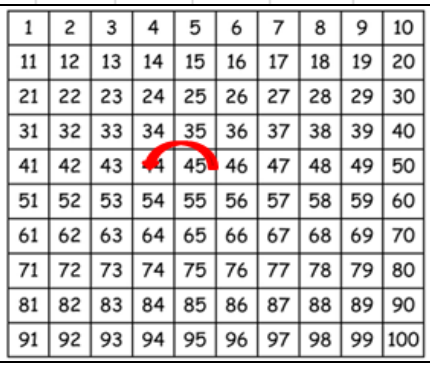
Formal method for adding in columns. Adding numbers up to three digits with no exchange into the next column. Add units, tens and then hundreds.		Units, tens hundreds. 1 unit + 1 unit = 2 units, 2 tens + 2 tens = 4 tens etc.
Adding numbers with up to four digits where there is at least one exchange between columns.		Same method as in previous stage, children recognise that 4 units + 8 units = 12 units. 12 units contains 1 ten, so the one must be written in tens column under the 'equals sign'. Then: 2 tens + 6 tens + 1 ten (below equals sign – 1 ten below equals sign is then crossed out to show it has been added.
Add numbers with different amounts of digits.		Method as above. Children recognise the place value of each column when lining digits up correctly.
Adding decimals with the same amount of decimal places.		Children look at how many numbers they have to add, then place decimal point into three rows to support lining digits up. Adding right to left, 7 hundredths + 2 hundredths = 9 hundredths etc.
Adding numbers with different amounts of decimal places.		Children add decimal point in three columns first. Vocabulary as in previous stage. Recognise there are 0 hundredths in top row so 0 hundredths +9 hundredths = 9 hundredths etc.

Subtraction

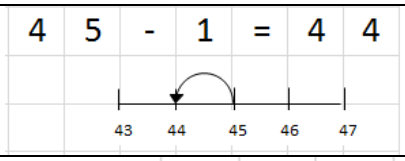
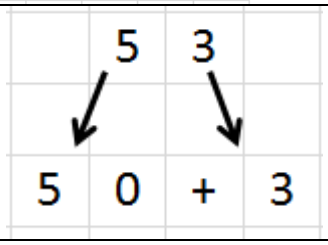
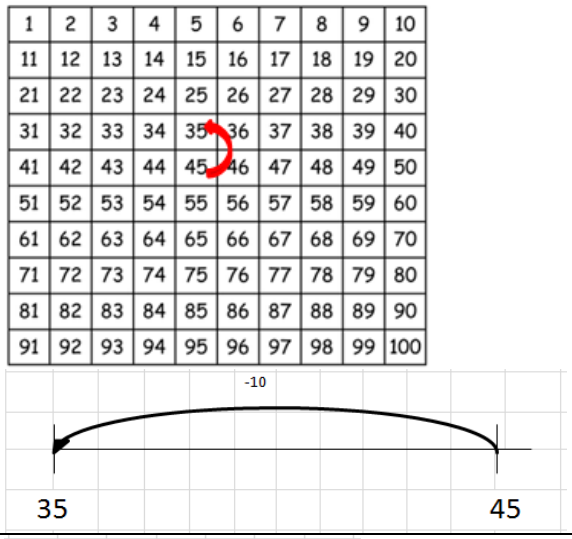
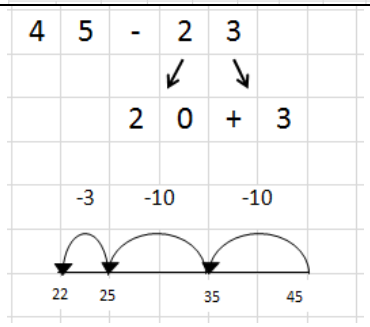
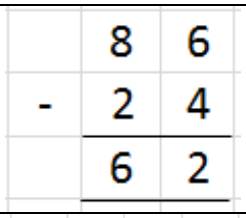
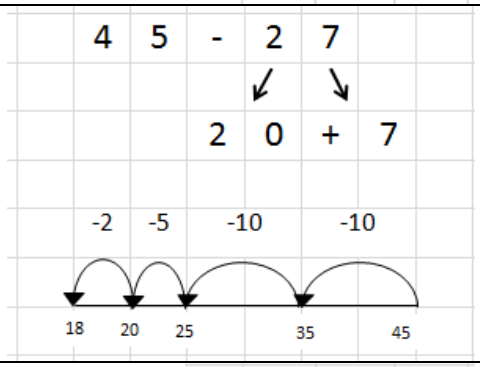
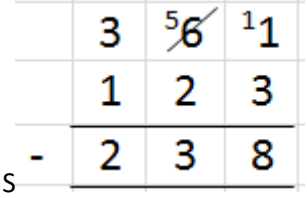
By the end of the Foundation Stage children are expected to confidently, consistently and independently do the following before moving on to the schools formal calculation policy:

- Say which number is one less than a given number.
- Subtract two single digit numbers.

To count back to find and answer (e.g. Count back 3 from 6).

Stage	Method	Vocabulary
Relate subtraction to taking away using physical objects. Physically manipulating objects to take away.		Three circles (objects) subtract 2 circles (objects) leaves one circle (object).
Subtracting by finding one less than a number for numbers up to three.		1 less than 7 is 6. 2 less than 7 is (counting back) 6, 5. 3 less than 7 is (counting back) 6, 5, 4.
Counting backwards along a number line for numbers that are further apart. Supported by using physical objects to support subtraction. Record calculations using – and = signs.		'If I take away (subtract) four there are 3 left.' 'Start at the biggest number… 7, 6, 5, 4, 3…'
Subtracting a 1 from a two digit number using a number line or hundred square.		Counting backwards in 1s.

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

		
Partitioning numbers in preparation for subtracting.		Recognising that numbers can be represented in different ways. 53 = 50 + 3. 5 10s and 3 units.
Subtracting multiples of 10 from two digit numbers using a number line or hundred square.		'Subtracting tens. The number in the tens column will change. 1 ten less than 45. There are 4 tens in 45 so one ten less will be 35 etc.'
Partitioning a number to be subtracted using a number line where the numbers in the units column isn't 'impossible'.		'23 is 2 tens and 3 units. Count back two tens first. He number in the tens column will be less. Start at 45….35….25…. Now units. 24…23…22..' The first step can be done as subtracting 20 in one go as approximate.
Formal method for subtracting in columns. Subtracting two digits from two digits with no exchange.		Children recognise place value of each digit. 6 units – 4 units = 2 units. 8 tens – 2 tens = 6 tens.
Partitioning a number to be subtracted using a number line where the numbers in the units column is 'impossible'.		As when using a number line two steps previously. When subtracting units, children recognise that 25 subtract 7 can't be done in one go, so represent this as two subtractions of 5 and 2.
Subtracting up to 3 digits with one exchange.		Recognise place value of each digit. '1 unit – 3 units is impossible. How can we make it possible? Exchange one ten.' Children exchange 1 ten from tens

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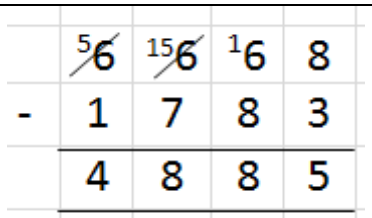
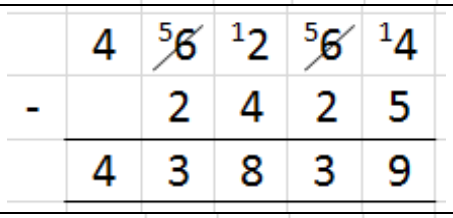
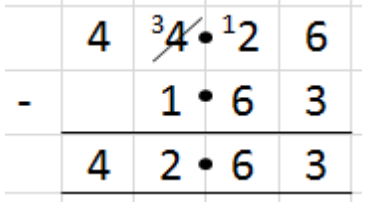
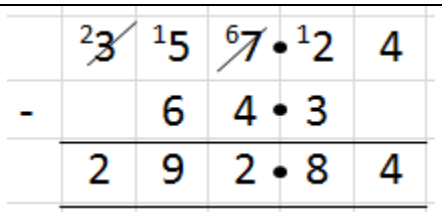
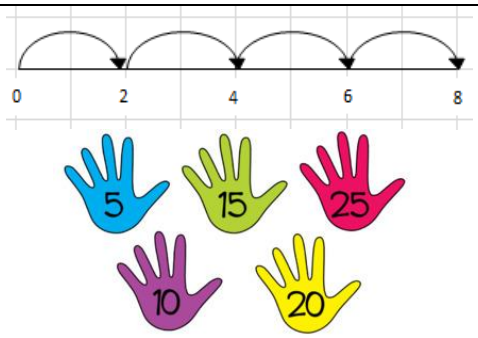
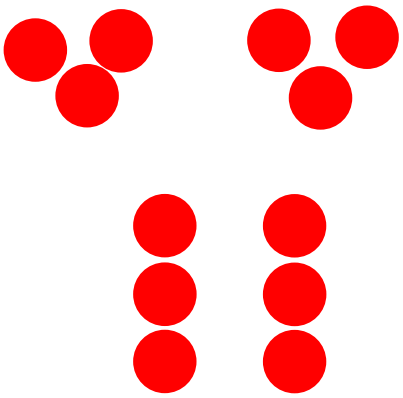
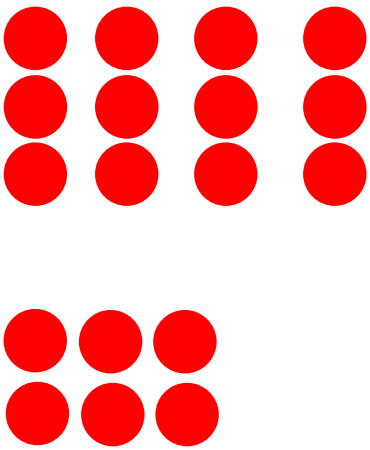
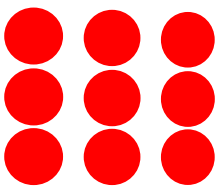
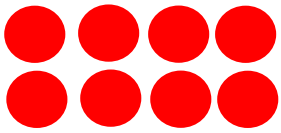
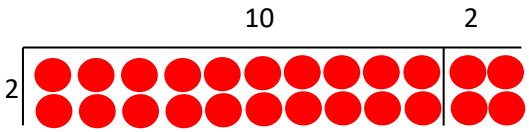
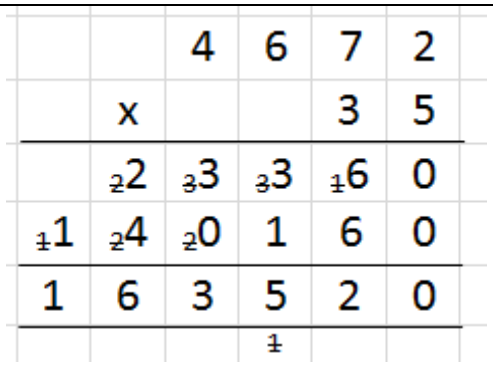
		column, cross out 6 and so it becomes 5 tens. 1 ten then goes to units to make 11 units. 11 units – 3 units = 8 units. 5 tens – 2 tens = 3 tens etc.
Subtracting numbers up to four digits with more than one exchange.		Method and vocabulary as above.
Subtracting numbers with different amounts of digits up.		As above. Children recognise place value of each digit and line numbers up right to left.
Subtracting decimals with the same number of decimal places.		Line numbers up using the decimal point. Recognise the value of each digit. 6 hundredths subtract 3 hundredths = 3 hundredths. 2 tenths subtract 6 tenths is impossible. To make it possible we need to exchange one unit from the next column.
Subtracting numbers with different amounts of decimal places.		As above. Children recognise the place value of each digit before subtracting. 0s can be added to the missing empty squares of the number being subtracted to support the calculation if desired.

Multiplication

By the end of the Foundation Stage children are expected to confidently, consistently and independently do the following before moving on to the schools formal calculation policy:
Solve problems that include doubling numbers up to 20.

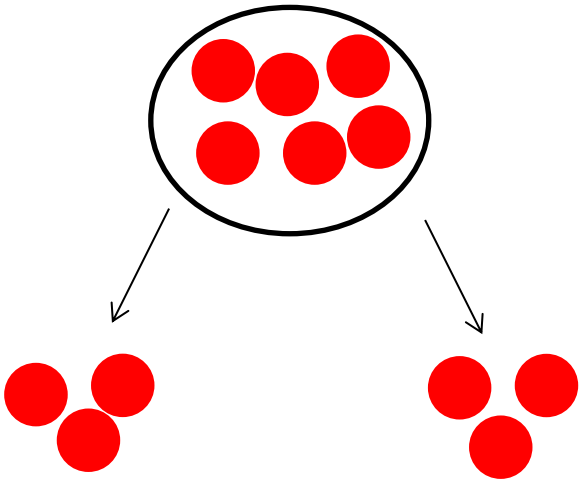
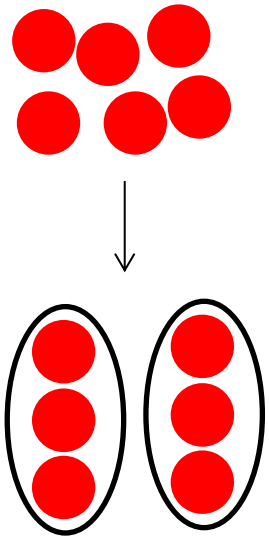
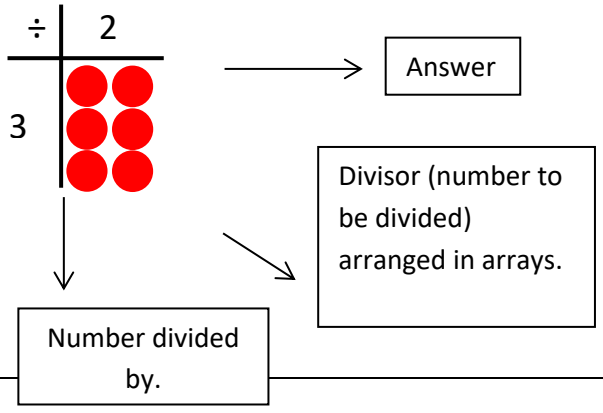
Stage	Method	Vocabulary
Counting in repeated groups. Manipulating and grouping physical objects and counting them.		Counting in 2s, 10s, begin to count in 5s.
Forming groups and arrays.		Groups – organising physical objects into groups and counting them.. 3..6…9… etc. Arrays – An **arrangement** of objects, numbers, counters etc into columns. Always **arrange** your **arrays** vertically.
Developing arrays to show visual representations of multiplications.		Counting in 3s using arrays. **Arrange** your counters vertically into groups of 3 and count. Make 3, 4 times. Count '3..6…9…12' etc. Make 2, 3 times. Count' 2…4…6…' etc. Always arrange arrays vertically.
One digit number multiplied by a one digit number in a number sentence.		Same language as before. 3 x 3 = 9 'An array/group of 3, 3 times. Count … 3…6…9… etc.'

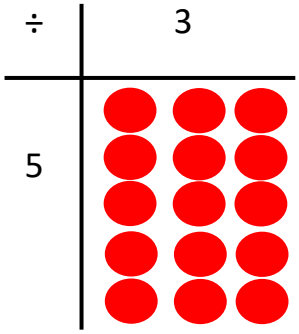
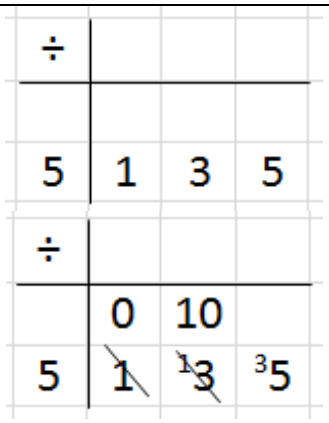
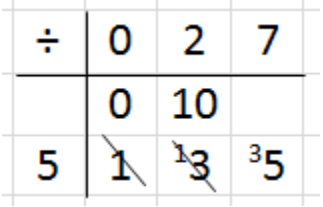
		2 x 4 – 8 'An array/group of 2, 4 times. Count…2…4…6…8 etc.'
Introducing partitioning to multiply two digits by one digit.	 2 0 + 4 2 4 x 10 2 2 20 4 2 0 + 4 2 4	12 x 2 = 24 Written method modelled alongside the array. 12 partitioned into 10 = 2. Count answer. Answer added at the end. Numerical array modelled alongside the array.
Introduction to expanded method for multiplication to reinforce place value. Number has no exchanges when adding answer.	6 7 2 x 5 1 0 3 5 0 3 0 0 0 3 3 6 0	Read calculation. 672 x 5. Three different calculations. Units first 2 x 5 = 10. Tens second. 70 x 5 = 350. (7 x 5 = 35 so 70 x 5 = 350) Hundreds third. 600 x 5 = 3000. (6 x5 = 30 so 600 x 5 = 3000). Encourage children to recognise how many 0s their answer should have based on what they know. E.g. 5 x5 – 25 so 5 x 50 = 250.) Answer added using same language as during column addition.
Expanded method for multiplication to reinforce place value. Exchanges when adding answer.	8 6 6 x 7 4 2 4 2 0 5 6 0 0 6 0 6 2 1	Language as above. Every column which is greater than 10 and needs exchanged into the next column is recorded under the '**equals sign'** at the bottom. Everything under the equals sign is added last and crossed out once it has been added.
Introduction to short method.	6 7 2 x 5 3 3 1 6 0	Read calculation. 672 x 5. Three different calculations. Units first 2 x 5 = 10. Exchange required. It is recorded at the bottom of the next square **above** the '**equals sign'.**

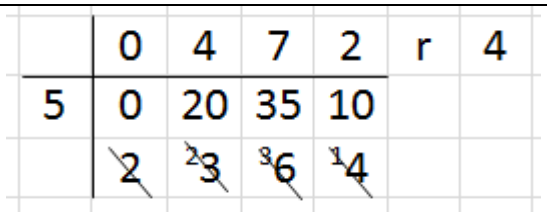
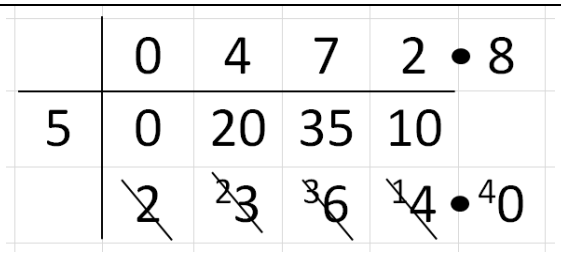
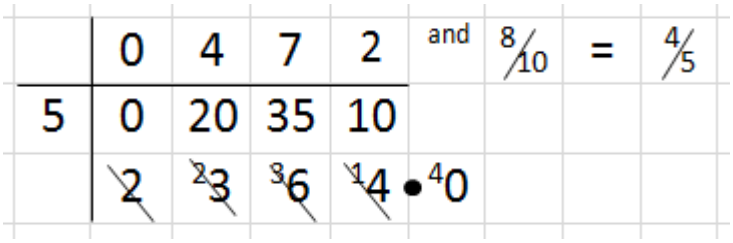
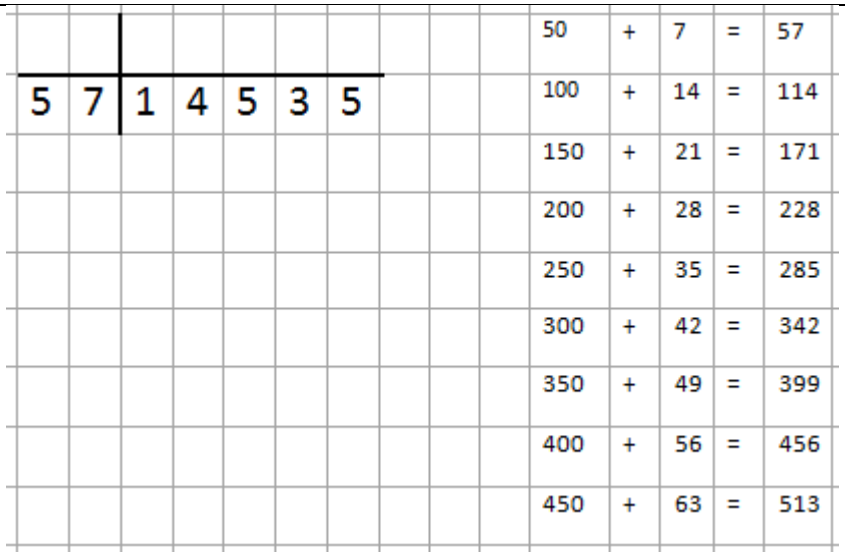
		70 x 5 = 350 one already in tens column so it becomes 360. Cross 1 in tens column out once it has been added.7 600 x 5 = 3000. Already exchanged 1 in hundreds columns so it is added and becomes 3100. Exchanged 100 is crossed out when added. Greater than 10 so exchange required. 3 recorded above equals sign.
Short method for multiplying by a two digit number.	 	Language exactly the same as previous stage. Discussing the value of everything that is multiplied. Two crows required because we're multiplying by a two digit number. Each number multiplied by 5. Row 1 E.g. 2 x 5 = 10 70 x 5 = 350 600 x 5 = 3000 4000 x 5 = 20000 Row 2 Each number multiplied by 30 2 x 30 = 60 70 x 30 = 2100 600 x 30 = 18000 4000 x 30 = 120000 Children recognise place value of each column related to each digit. Exchanges carried out as above when multiplying. Add at the end. Exchanges for addition go under the equals sign. Crossed out when added.

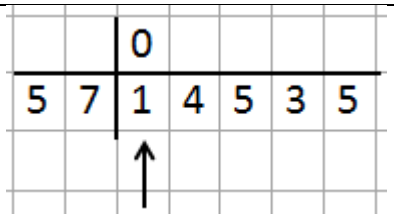
Division

By the end of the Foundation Stage children are expected to confidently, consistently and independently do the following before moving on to the schools formal calculation policy:
Solve problems by halving and sharing numbers up to 20.

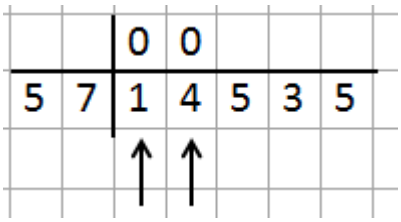
Stage	Method	Vocabulary
Practical sharing. Children begin to understand how to share objects into equal groups. Counting in 2s, 5s and 10s.		Sharing objects into different groups. 6 objects shared between two people. How many do they get each? Children share objects into groups one at a time.
Practical grouping. Groups of objects arranged into arrays.		How many groups of 3 can we make? There are 6 sweets, how many can two people have each? Arrays always arranged vertically.
Introduction of division sign showing array and corresponding number sentence.		6 ÷2 = 3 Amount to be divided (divisor) under the division sign (6) arranged in arrays, number divided by (3) to the left, answer (number of arrays) above (2). This is the point where children may become

		confused by sharing; making groups of, making arrays, dividing. This should be reinforced with lots of practical hands on activities where the children can hear a range of mathematical vocabulary.
Develop division by arrays to include larger numbers (52, 10s etc)		15 ÷ 5 = 3. Language used as in previous stage.
Introduction to short method for division.	 	Step one. Division out to resemble division in arrays. Step 2. We ask 'do we like these numbers in the 5 times table?' 1 hundred (in hundreds column is smaller than number were dividing by so it is carried into tens column to make 13 tens) We don't like 13 tens in 5 times table so it is crossed out and replaced by closest number to 13 in 5 times table -10-. 3 tens remaining is carried to units column making 35 units. We like 35 in 5 times table so that doesn't need to be modified. We're ready to solve. Step 3 – solving. 'How many times 5 gives us 0 hundred = 0.' Answer written above. 'How many times 5

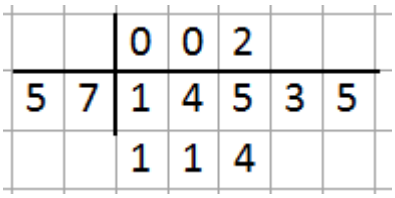
		gives us 10 tens = 2’ Answer written above. ‘How many times 5 gives us 35 units = 7.’ Answer above. Place value of each digit
Developing short with numbers that leave remainders.		Method and steps the same as above. When we reach the units column. ‘We don’t like 14 in the 5 times table, we like 10. There are four units left over but nothing to carry the 4 units to so it becomes the remainder.
Short division but representing a remainder as a decimal or fraction.	 	Steps the same as above. To show the remainder as a decimal. 4 units remainder. Insert the decimal point after the units column. Carry the 4 units into the **tenths** column. Add a zero. The zero has no value, so it doesn’t change the value of the number. How many times 5 gives us 40 tenths = 8. Answer given above. Remainder can be show as a fraction by following the same steps as above. 8 tenths is simplified to 4 fifths.
Long division		Children are encouraged to write out their 57 times tables partition numbers, writing multiples and then adding together.



Look at the first number – we don't like 1 in 57 times table because it is smaller than 57. So 0 goes above 1 because 57 goes into 1, zero times.

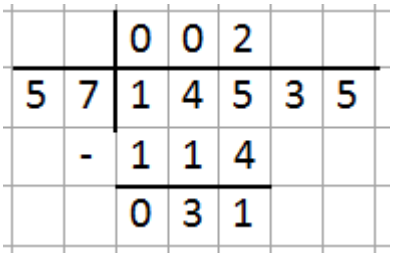


Look at second two numbers together – we don't like 14 in 57 times table because it is smaller than 57. So 0 goes above 4 because 57 goes into 14, zero times.



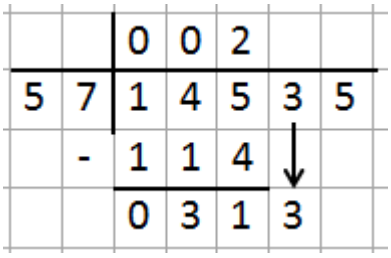
Look at next three numbers together.
We don't like 145 but it is bigger than 57 so we like a number that is smaller than 145 in 57 times tables. We like 114, 2 times in 57 times table, so 2 goes above 5.

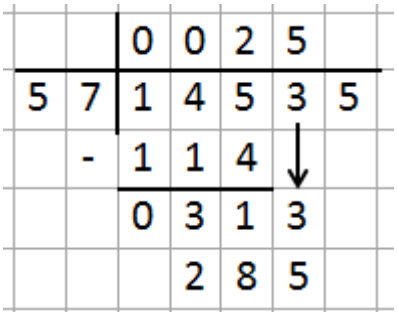
Subtract 114 from 145.



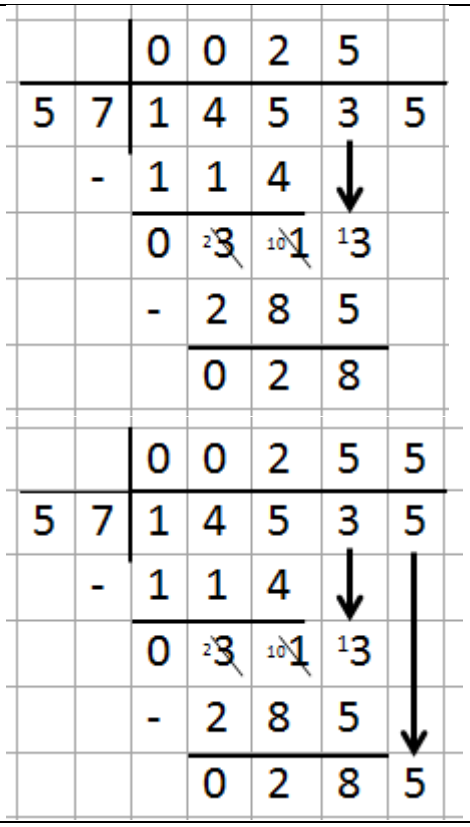
+

Bring down the 3 to make 313.





We don't like 313 in 57 times tables but we like 285, 5 times. So 5 goes about 3 as answer.

		Subtract 285 from 313. Bring the final 5 down to make 285. We like 57, 5 times in 57 times table so put final answer of 5 at the top.

Glossary

Array - a set of objects or numbers arranged in order, in columns when multiplying and dividing.
Calculation – A mathematical operation (not to be referred to as a sum).
Addition
Addition – increase, sum, total, plus, how many.
Subtraction – decrease, difference, reduce, subtract, minus.
Multiplication – product of, times, groups of, lots of, array.
Division - shared, divided, grouped, equal parts, parts of.
Equal – the same as. Two lines under a calculation.