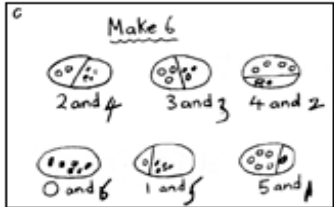
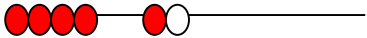
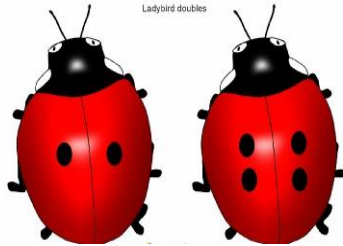


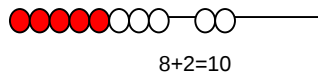
Marshgate Primary School Calculation Policy

YEAR GROUP	Addition	Subtraction	Multiplication	Division
EYFS (Reception)	Using a range of practical resources and real life contexts, pupils develop an understanding of the concept of addition through counting activities.  Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. 	Use a range of practical resources to develop understanding of subtraction.  Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc. Numicon to be used to solve subtraction problems.  Bead strings can be used to illustrate subtraction. $6 - 2 = 4$  Children use number lines and practical resources to support calculation. Teachers to demonstrate the use of the number line.	Doubling using practical representations.  Drawing out to represent calculation  Children experience equal groups of objects. 'Double' should also be introduced at an early stage. They will begin to count in 2s and 10s and then in 5s.  $2 + 2 + 2 + 2 + 2 = 10$	Introduce halving through stories and practical problem solving. For example: Joe has 6 sweets he shares them equally with a friend. How many do they have each? Introduce sharing using practical resources and real life scenarios. 

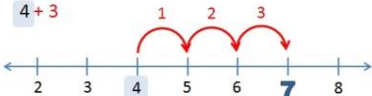
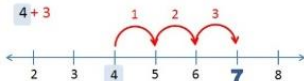
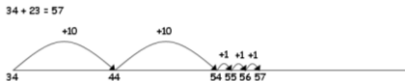
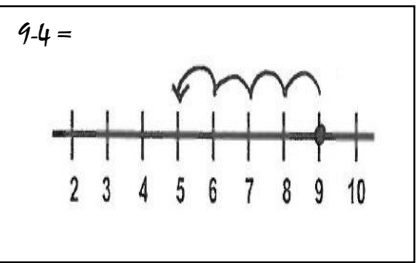
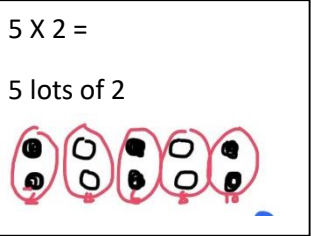
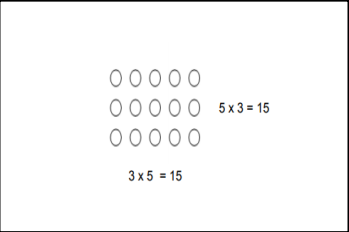
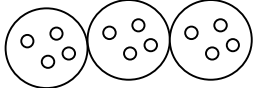
Numicon can be used to show representations of addition number sentences.



Bead strings or bead bars can be used to illustrate addition



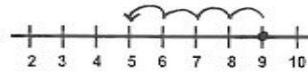
They use number lines and practical resources to support calculation and teachers demonstrate the use of the number line.

YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y1	Children will be taught practical addition using numicon and other concrete resources.  18 add 10 = They will use number lines and practical resources to support calculation and teachers demonstrate the use of the number line. Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.  Children to use number line to solve missing number problems. $4 + ? = 7$  Children will begin to use 'empty number lines' themselves starting with the larger number and counting on. First counting on in tens and ones and then progressing to larger numbers. 	Children will be taught practical subtraction using numicon and other concrete resources.  28 - 10 = They will use number lines and practical resources to support calculation and teachers demonstrate the use of the number line. Children to use tens and ones. Children to be taught to count back individual steps on a number line with given numbers.  Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones. The number line should also be used to show that 6 - 3 means the 'difference between 6'	Numicon and other appropriate pictorial representations to be used to represent calculation. $6 \times 5 =$  Visual drawing of multiplication $5 \times 2 =$ 5 lots of 2  Arrays to be used to represent calculation. 	Sharing equally Practical sharing with objects first. 12 shared between 3  Children to then draw out pictorially and represent as a number sentence. $12 \div 3 =$ 

and 3' or 'the difference between 3 and 6' and how many jumps they are apart.

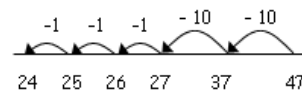
Children begin to use empty number lines to support calculations including a missing number sentence

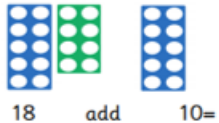
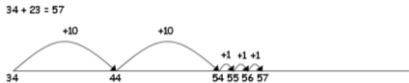
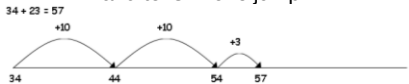
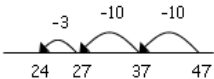
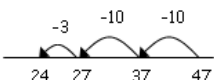
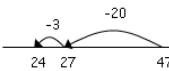
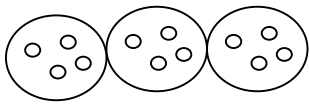
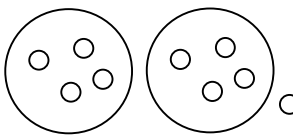
$$9 - ? = 5$$



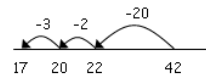
Progress to counting back in tens and ones.

$$47 - 23 = 24$$



YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y2	Children to use concrete resources such as numicon, base ten, bead strings etc. to add smaller numbers and multiples of ten.  18 add 10 = Children to use number lines to add and be taught to count on/forwards.  34 + 23 = 57 Children will then be taught to add units and tens in one jump.  34 + 23 = 57  34 + 23 = 57 Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. $34 + 65 =$ $60 + 30 = 90$ $5 + 4 = 9$ $90 + 9 = 99$ $46 + 38 =$ $40 + 30 = 70$ $8 + 6 = 14$ $70 + 10 + 4 = 84$	Continue to use concrete resources to support subtraction  28 - 10 = Continue to use empty number lines to support calculations. First counting back in tens and ones. $47 - 23 =$ $47 - 23 = 24$  24 27 37 47 Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 - 3 = 4). $47 - 23 = 24$  24 27 37 47 Subtracting the tens in one jump and the units in one jump. $47 - 23 = 24$  24 27 47 Bridging through ten can help children become more efficient.	Repeated addition to show relationship with multiplication. Understand multiplication as repeated addition 5 added together 3 times is 5+5+5 or 3 lots of 5 or 3 groups of 5 or 3 times 5 or 3x5 or 5 times 3 or 5x3 Use cubes, numicon, counters, peg boards, draw arrays, draw pictorial images of the word problem, draw arrays (draw in an organised format) etc I have 3 bags of sweets. Each bag has 4 sweets in it. How many sweets do I have?   4+4+4=12 3x4=12 4x3=12 <u>Arrays</u> Children should be able to model a multiplication calculation using an array.  5 x 3 = 15 3 x 5 = 15 Pupils should solve multiplication problems mentally using 2s 5s 10s tables they have learnt by heart or using an empty number line. Using symbols to stand for unknown numbers to complete equations using inverse operations $\square \times 5 = 20$ $3 \times \triangle = 18$	Emphasis in Y2 is on grouping rather than sharing. Recap Y1 – sharing pictorially. Draw diagram and represent as a number sentence. $12 \div 3 =$  Grouping or repeated subtraction There are 6 sweets, how many people can have 2 sweets each?  Complete equations using inverse operations $\square \div 2 = 4$ $20 \div \triangle = 4$ $\square \div \triangle = 4$ Children should also move onto calculations involving remainders. $9 \div 2 =$ 

$$42 - 25 = 17$$



Children continue to use empty number lines with increasingly large numbers.

Partitioning numbers can be introduced when subtracting numbers. For example:
 $52 - 28 =$

$$52 - 20 = 32$$

$$32 - 8 = 24$$

Bar modelling to be used.
 $24 + 13 =$

37	
24	13

$$24 + ? = 37$$

$$13 + ? = 37$$

$$37 - ? = 24$$

$$37 - ? = 13$$

Use bar models to show:

a. $12 \div 2 =$

12	
6	6

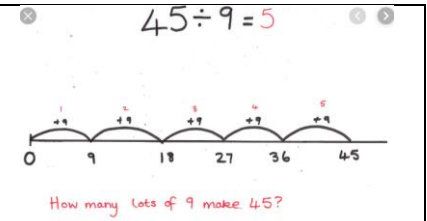
YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y3	Bar model to be used for missing number problems with two digit numbers 24 + 13 = 37 24 13 13 + ? = 37 37 - ? = 24 37 - ? = 13 Add numbers up to 3 digits using the compact column method – including regrouping. For example: 243 +368 611 1 1	Use the number line method to practice counting backwards for numbers up to 3 digits 64 - 23 = 41 -3 -20 41 44 64 646 - 249 = 397 -3 -6 -40 -200 397 400 406 446 646 Subtract numbers up to 3 digits using the compact column method – including exchanging. For example: 874 -523 351 Answer: 351	Repeated addition demonstrated on a number line or with concrete resources. See below example. 5 5 5 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 With resources (for children needing extra support): 5 5 5 5 5 5 5 5 5 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Grid method: 37 5 30 150 7 35 37 x 5 = 150 + 35 37 x 5 = 185	Number line to be used to conduct repeated subtraction. -4 -4 -4 0 1 5 9 13 Bar modelling to be used (supported by showing the inverse). e.g. 20 ÷ 5 = 4 20 ? (Then this can easily be tied in with multiplication.) Use of arrays: 4 4 4 4 12 ÷ 3 = 4 Combining concrete resources with number line grouping: 6 ÷ 2 2 2 2 0 1 2 3 4 5 6 3 groups

x	30	4		600
20	600	80		80
				90
3	90	12	+	12
			=	782

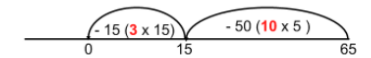
$23 \times 34 = 782$

Short method for multiplication introduced (2 digit by 1 digit):

$$\begin{array}{r} 267 \\ \times 3 \\ \hline 201 \end{array}$$



Introduce chunking with small numbers (using number line to support concept)
65 ÷ 5 = You might do individual jumps of 5 or...

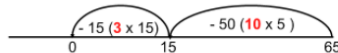


Add together the number of jumps you have made = (3 + 10) = 13

Short division methods using known multiplication facts.

E.g.

$$\begin{array}{r} 32 \\ 3 \overline{)96} \end{array}$$

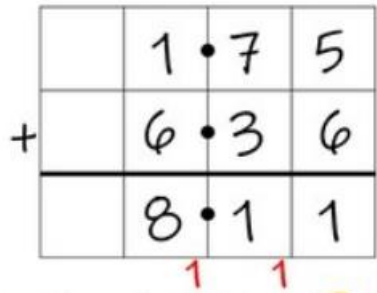
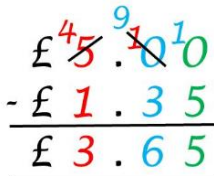
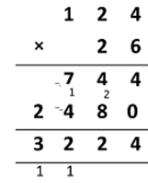
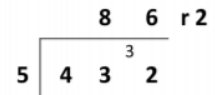
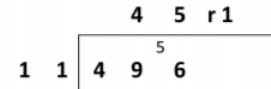
YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y4	Add numbers up to 4 digits using the compact column method – including regrouping. For example: 789 + 642 becomes $\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline \end{array}$ Answer: 1431	Subtract numbers up to four digits using the compact column method – including exchanging For example: 874 – 523 becomes $\begin{array}{r} 874 \\ - 523 \\ \hline 351 \\ \hline \end{array}$ Answer: 351 932 – 457 becomes $\begin{array}{r} 8 \quad 12 \quad 1 \\ 932 \\ - 457 \\ \hline 475 \\ \hline \end{array}$ Answer: 475	Short method for multiplication. For example: 24 × 6 becomes $\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline \end{array}$ Answer: 144 342 × 7 becomes $\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline \end{array}$ Answer: 2394 Expanded column method to be used <u>only</u> if children are finding this method difficult. $\begin{array}{r} 36 \\ \times 15 \\ \hline 30 \quad (6 \times 5) \\ 60 \quad (6 \times 10) \\ 150 \quad (30 \times 5) \\ 300 \quad (30 \times 10) \\ \hline 540 \end{array}$	6 $\overline{) 882}$ - 600 6 × 100 282 - 240 6 × 40 42 42 6 × 7 (Chunking on a number line may shown to support concept) 65 ÷ 5 = You might do individual jumps of 5 or...  Add together the number of jumps you have made = (3 + 10) = 13 Short division (bus stop): Short division 98 ÷ 7 becomes $\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \hline \end{array}$ Answer: 14

For children requiring more support in multiplication:
Grid method: Multiply the partitioned numbers, then add the totals together.

$$75 \times 429 =$$

x	400	20	9
70	28,000	1400	630
5	2000	100	45

$$= 32,175$$

YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y5	Add numbers with more than 4 digits using the column method as above – including regrouping. When adding decimals (2dp), children will use the column method and be taught that the decimal point always stays in line. Children will be taught to add decimals up to 2dp, including those that regroup. 	Subtract numbers with more than 4 digits using the column method as above – including exchanging. When subtracting decimals (2dp), children will use the column method and be taught that the decimal point always stays in line. Children will be taught to subtract decimals up to 2dp, including those that exchange. Line up the decimal points  £5.00 - £1.35 	Short method: 2741 × 6 becomes  Answer: 16 446  Answer: 3224 Use expanded column method as in Y4 for LAPS/SEND.	Short division (bus stop) 432 ÷ 5 becomes  Answer: 86 remainder 2 496 ÷ 11 becomes  Answer: 45 $\frac{1}{11}$ Some children will be ready to progress to long division methods (without a remainder in the first instance)

$$\begin{array}{r} 67 \\ 36 \overline{) 2412} \\ \underline{216} \downarrow \\ 252 \\ \underline{252} \\ 000 \end{array}$$

YEAR GROUP	Addition	Subtraction	Multiplication	Division
Y6	Add numbers with more than 4 digits using the column method as above – including regrouping. When adding decimals (3dp), children will use the column method and be taught that the decimal point always stays in line. Children will be taught to add decimals up to 3dp, including those that regroup. Children will also be taught to use zero as a place holder when adding decimals with different decimal points or when adding decimals to whole numbers. Line up the decimal points $\begin{array}{r} 1.234 \\ + 4.1 \\ \hline 5.334 \end{array}$ Zero to be used as a place holder in the example above.	Subtract numbers with more than 4 digits using the column method as above – including exchanging. When subtracting decimals (3dp), children will use the column method and be taught that the decimal point always stays in line. Children will be taught to subtract decimals up to 3dp, including those that exchange. Children will also be taught to use zero as a place holder when subtracting decimals with different decimal points or when subtracting decimals from whole numbers. $5 - 3.54 =$ $\begin{array}{r} 5 \\ 3.54 - \\ \hline \end{array}$ Zero to be used as a place holder in the example above.	Same methods as above in Y5 but for larger numbers. $\begin{array}{r} 502 \\ \times 336 \\ \hline 3012 \\ 15060 \\ + 150600 \\ \hline 168672 \end{array}$ <u>Multiplying decimals</u> $\begin{array}{r} 2.34 \\ \times 1.2 \\ \hline 2.808 \end{array}$ 2 decimal places + 1 decimal place 3 decimal places 1. Multiply as normal (ignoring the decimal points). 2. Count the total amount of digits after a decimal point in the question. 3. Make sure that is the amount of digits after a decimal place in the answer (supplementary explanation of this method is given so children understand they have e.g. made a number in the question 1000 times larger by ignoring the decimal point, so they must make the answer 1000 times smaller)	Same methods as above in Y5. Progress onto long division when chunking is secure (including remainders and decimal remainders). 432 ÷ 15 becomes $\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$ Answer: 28.8 When dividing with decimals, use the appropriate long or short method. Remove the decimal point, complete the calculation and then add the decimal back in. $\begin{array}{r} 1.3 \\ 7 \overline{) 9.1} \end{array}$