Marazion School Mathematics Calculation Policy MMXXIII



Introduction

The purpose of this document is provide information and clarity about the calculations which are required to be learnt by primary aged children as part of the primary mathematics curriculum.

This policy aims to model and explain key mathematical principles and methods taught on a daily basis at Marazion school. The policy also demonstrates progression as students move through different year groups and classes throughout their school life and ensures consistency when teaching mathematics.

The main focus of this policy is the four mathematical operations (addition, subtraction, multiplication and division) particularly written strategies requiring workings. The policy also makes links to mental calculation, it is crucial that these strategies are discretely taught and linked to written strategies and not limited to starter or arithmetic lessons.

One key intention of this calculation policy is to provide detail and ease of access for its readers. The methods in the policy are detailed with:

- The relevant year group,
- Pictorial examples,
- Written teaching/advise points,
- A video example by a pupil accessible via a QR code.

Note: In order to access a video example, a QR code reader is required. A QR code reader can be downloaded via an app onto any mobile device. Once downloaded, the app can be used to scan the QR code either from the screen of a computer or from a printed example of the document.

Marazion Maths

Mission Statement

Teach, Learn, Confuse, Understand

At Marazion School we aim to:

- To relentlessly teach mathematics through the fundamentals of fluency, problem solving and reasoning which permits children to develop a clearer and deeper understanding of the rules, methods, variations and anomalies of mathematics.
- To also allow pupils an opportunity of becoming mathematically literate through knowledge of number facts, the four operations, relevant methods and the best strategy to use and be able to apply these to everyday-life problems.
- To finally give pupils an opportunity to develop their mathematical thinking and creativity capacity through enhancing opportunities for problem solving and reasoning, which will give students a mindset to solve problems of the present and the future and potentially make a difference in the world.







Working towards using an expanded column method.	
34 = 30 and 4 13= 10 and 3	
<u>T 0</u>	
30 4	
+ <u>10 3</u>	
40 7	
40 + 7 = 47	



	Year 4	
Introduce Column Addition Method	<u>Th H T O</u> 3 7 3 9 + <u>4 2 2 3</u> 7 9 6 2 <u>X</u> <u>Teaching Points</u>	

 Progression from expanded to compact method (modelled alongside expanded method) Calculate from ones column, 	
Label H T O etc in columns,One digit per square.	



	Year 6	
Column Addition Method	 3, 6 4 3, 1 2 4 + 3, 2 2 7, 7 3 1 6, 8 7 0, 8 5 5 X Teaching Points Progressing to addition of numbers up to ten million, Initially when dealing with numbers of this size avoid calculations which involve multiple 'carrying', Reiterate the value of each digit when modelling, 	
Column Addition Method up to 3 decimal places	 0.557 + 1.211 0.202 <u>1.970</u> <u>1.970</u> <u>1.970</u> <u>1.970</u> Progressing to addition of numbers up to ten million, Initially when dealing with numbers of this size avoid calculations which involve multiple 'carrying', Reiterate the value of each digit when modelling, Reiterate the importance of 0's as place holders where appropriate. 	





	Year 1	
Year 1	Sam spent 7p. What was his change from 20p?	
Subtractio	Use practical resources to work	<u>∎787</u>
n	systematically crossing out to	- 336 - 2366 -
	subtract. Ensure real example of	
	taking away.	二部に示け
	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	E state
	Continue usage of number lines,	
	promoting increase of jumps and	
	more than one number at a time.	
	Working towards finding the difference between numbers nearer the end of the year.	
	Variation activities through missing number problems. = 7 - 3 4 = - 3 4 = 7 - 0	





	 Introduce use of inverse to check calculation, One digit per square. 	
Introduce Column Subtraction Method	<u>H T O</u> 9 2 5 - 2 1 1 7 1 4	
	 <u>Teaching Points</u> Calculating subtractions with numbers up to 1000, No exchanging at this stage, Begin subtraction from ones column, Introduce use of inverse to check calculation, One digit per square. 	

Year 4		
Column Subtraction Method	 2 1 3 4 6 - <u>1 6 3</u> <u>1 8 3</u> <u>Teaching Points</u> Calculating subtractions with numbers up to 10,000, Vocabulary use of exchange rather than borrow, Use resources to practically model exchange until secure, Begin subtraction from ones column, Begin formal method by only using one exchange per calculation until secure, Introduce use of inverse to check calculation, One digit per square 	

	Year 5	
Subtraction using a number line	 12462 - 2300 = 10,612 10612 12612 <u>Teaching Points</u> Calculating subtractions with numbers up to 10,000, Use of number line drawn with ruler a promoted strategy, Can subtract or count on, ensure if subtracting jumps occur beneath line, if counting on jumps above line, Begin subtraction from ones column. 	
Column Subtraction Method	 7, 89 910, 16 2, 5 9 8 5, 3 0 8 <u>Teaching Points</u> Introduce subtraction with larger numbers up to one million, Vocabulary use of exchange rather than borrow, Progress to calculations with multiple exchanges, Estimation of answer promoted e.g. 7900 – 2600 = 5300 Use of inverse to check calculation. 	

	Year 6	
Column Subtraction Method	$ \begin{array}{r} ^{6 \ 1 \ 2 \ 1} \\ 9, \ \ \ \ \ \ \ \ \ \ \ \ \$	
	 <u>Teaching Points</u> Introduce subtraction with larger numbers up to ten million, Multiple exchanges in calculations, Estimation of answers promoted, Use of inverse to check calculation. 	
Column Subtraction up to 3 decimal places	3 15.67 10412 - <u>8.653</u> <u>27.059</u>	
	 <u>Teaching Points</u> Introduce subtraction with numbers up to 3 decimal places, Multiple exchanges in calculations, Introduce calculations with 0's as place value holders. 	







Year 1 Year 1 **Ensure embedded** Multiplication understanding on concept of doubling before advancing further. Use concrete objects, image representations and arrays to show repeated addition. 5+5+5=15 3+3+3+3=15 3 + 3 + 3 + 3 = 12 x x x x xx x x xx x x x

How many cupcakes can we bake? 3 + 3 + 3 + 3 = 12

Begin to count in 2's, 5's and	
10's linking to times tables	
recall.	

	Year 2	
Year 2	Pupils begin to learn and recite	जिल्हे र भाषा
Multiplication	to find X4 where appropriate.	
	Recap repeated addition and	- <u></u>
	use of arrays.	
	5+5+5=15 3+3+3+3=15	
	Combine repeated addition	
	steps to write calculation as	
	5 x 3 and demonstrate how this is equivalent to 3 x 5.	

Also demonstrate	
multiplication on a number	
line. E.g. 3 x 4 = 12	
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	

Year 3					
Year 3 Grid					
Method	x	3	_		
	30	90	_		
	4	12	_		
		102			
	 Teaching Points Practise times tables (2x, 5x, 10x, 3x, 4x, 6x, 8x, 9x) on daily basis, Apply times tables to grid method, Promote listing of tables to assist calculations, Use doubling to assist calculations e.g. double 2x to find 4x tables 		Points s tables (2x, 5x, k, 8x, 9x) on ables to grid ng of tables to cions, to assist s.g. double 2x to		

		Yea	r 4	
Year 4 Grid Method	x 30 4 <u>Teach</u> • P 1 • A • P 1 • A • P	3 90 12 102 ing Points ractise times t 2x) on daily ba pply times tab nethod, romote listing ssist calculatio Jse doubling to alculations e.g	ables (up to sis, les to grid of tables to ns, assist . double 2x to	
Year 4 Expanded Column Method	f X - - - - - - - - - - - - - - - - - -	HTO14214244481604000568eachingPractise times t2x) on daily bansure lining upromote listingssist calculationJse doubling toalculations e.gind 4x tables,One number pe	(4 X 2) (4 X 40) (4X100) Oints ables (up to isis, o of columns, of tables to ns, assist . double 2x to er square.	



		•	Escalate difficulty of calculation to two digit multiplied by digit multiplication	
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	Year 6				
Year 6 Column Multiplication Method	 1514 X 23 4542 30280 3 4542 30280 3 4542 3 3 4542 3 3 4542 3 3 4522 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 3 4822 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5				
Resources	Resources to support learning throughout				
multiply 3x4 3x10	all year groups: - Base ten, - Cubes, - Bar models, - Concrete objects. 25 5+5+5=15 3+3+3+3=15	25 25			

DIVISION

Foundation Stage

Foundation

Stage Division

Focus on halving using concrete objects. Use play dough as equipment to cut into half. Use of number stories for understanding.

Repeated focus: doubling = bigger halving = smaller



Year 1			
Year 1 Division	One step division problems to be introduced. Reinforce concept and focus that doubling = bigger and halving = smaller.		
	Develop halving through understanding of halving shapes moving onto halving numbers.		



Year 2 Year 2 Division problems are approached using multiplication Division facts particularly multiplication tables (x2, x5 and x10). Multiplication arrays can be used to demonstrate a range of number sentences. E.g. 3 + 3 + 3 + 3 + 3 = 15 5 + 5 + 5 = 10Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$ Begin to share numbers using a number line method. E.g. Share 18 into 3 groups. Sharing 15 18 Differentiate between sharing and grouping.

Grouping - E.g. How many 3's	
make 18?	
Grouping	
Ensure sharing uses jumps	
beneath line and grouping uses	
jumps below the line.	

	Year 3	
Introduce	13	
Chunking	4 52	
Division		
Method	(4 X <u>10</u> = 40) - <u>40</u>	
	(4 X <u>3</u> = 12) - 12	
	<u>12</u>	
	0	
	 <u>Teaching points</u> Clear and frequent modelling of layout, Begin chunking with 2x, 3x and 5x tables before moving onto more complex, Use remainder instead of decimal answers at this stage, First question is 'can I take a chunk of 10', Check answers using inverse 	



	Y	ea	r 5	
Short	01 9	96r3/6	5	
Division (bus	6 11 ₅7	7 ₃9		
stop)	6	30	54	
Method	12	36	60	ND 2 🙀 (1.01
	18	42	66	
	24	48	72	
	Teaching points			
	 Still use chunking method if required, 			

Writing times tables next to
calculation promoted,
Begin with providing answers
with a remainder,
Develop to providing answers
as fraction and then decimal
point e.g. 3/6 then 0.5.

	Year 6		
Short	0196.5		
Division (bus	6 11₅7₃9. ₃0		
stop)	6 30 54	6[117]	
Method			
	24 48 72		
	Teaching points		
	Use hus stop method to quickly		
	find division answers with		
	divisors up to 12,		
	Use tables knowledge to find		
	answers to division questions		
	with larger divisors such as 13,		
	15 or 20 etc,		
	Target to work efficiently and		
Churching	at speed.		
Chunking	057		
Division	14 7 8 4		
Method	(14 x <u>50</u> = 700) - <u>700</u>		
	084		
	(14 x <u>5</u> = 70) <u>70</u>		
	14		
	(14 x <u>2</u> = 14) <u>14</u>		
	00		
	50 + 5 + 2 = 57		



FRACTIONS

Year 3



	Year 4	
Add and subtract fractions with numbers of the same denomination up to a whole.	 4/6 + 2/6 = 6/6 7/9 - 2/9 = 5/9 <u>Teaching points</u> Verbalisation of fraction rules (numerators change, denominator stays the same) Ensure children recognize what a whole looks like, Compare and order fractions with same denomination. 	

Year 5			
Add and			
subtract	$2/6 \pm 5/6 = 7/6 = 1/1/6$		
fractions	2/0+3/0=7/0= 1/0		
beyond a			
whole and	3/4 + 1/8	and the second second	
with			
dominators	6/8 + 1/8= 7/8	LEI CONEQUEZ VILLAMENTA	
that are			

multiples of the same number.	 <u>Teaching points</u> Use questions with answers larger than a whole, Introduce conversion of improper fractions (6/7) to mixed number (1 1/6), Use knowledge of times tables for quick and efficient conversion, Ensure when making fractions larger both the numerator and denominator are multiplied. 	
Multiply proper fractions by whole numbers.	$1/5 \times 3 = 3/5$ $3/5 \times 4 = 12/5 = 2 2/5$ 2 wholes and 2/5 left over.	
	 <u>Teaching points</u> Use questions with answers larger than a whole, Introduce conversion of improper fractions (6/7) to mixed number (1 1/6), Use knowledge of times tables for quick and efficient conversion, 	

	 Model using diagrams and encourage use of drawn diagrams. 				
Year 6					
Add and subtract fractions with	2/7 – 1/9				
different dominators.	$7 \times 9 = 63$ $2 \times 9 = 18$				
	1 x 7 = 7				
	18/63 – 7/63 = 11/63				
	 Remind children to multiply the denominator – denominator needs to be the same for adding and subtracting. Multiply each numerator by the number the child multiplied the denominator If mixed number see Year 5 converting method 				
Multiply	4/5 x 400				
	4 x 400 =1,600				

Multiply a fraction by a hole number	 1,600 / 5 = 320 <u>Teaching points</u> Remind children the denominator is how many parts the whole is cut into Multiply the nominator by the whole number giving the child an improper fraction Child to convert the improper fraction to a mixed number – or in the above case, a whole number If mixed number see Year 5 converting method 	
Divide a Divide a fraction by a whole number	$6/3/2$ $6/1/3/2$ $6/1 \times 2/3$ $6 \times 2 = 12$ $1 \times 3 = 3$ $= 12/3 \text{ or } 4$ $\overline{\text{Teaching points}}$ • Children need to write the whole number as a fraction • To divide a fraction you	

	reciprocal of the second	
	fraction – flip the	
	fraction	
	Multiply the numerator	
	by the numerator and	
	the denominator by the	
	denominator	
	• Simplify the fraction	
	where needed	
	If mixed number see	
	Year 5 converting	
	method	
Find a fraction	7/10 of 30	
of a whole		
number	30 / 10 = 3	
	7 x 3 = 21	
	Teaching points	
	Divide the whole number	
	by the denominator	
	 Multiply that answer by 	
	the numerator	
	 If mixed number see 	
	Vear 5 converting	
	method	