

Calculations policy



Independent Learners for Life
whatever it takes

Year 5

ADDITION AND SUBTRACTION

Year group 5

<p>NC end of year statements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • Mentally add and subtract tenths, and one-digit whole numbers and tenths. • Add and subtract decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, $0.83 + 0.17 = 1$). 	<p>Non statutory guidance</p> <p>Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see Mathematics Appendix 1).</p> <p>They practise mental calculations with increasingly large numbers to aid fluency (for example, $12\,462 - 2300 = 10\,162$).</p>
<p>Pre-requisite skills</p> <ul style="list-style-type: none"> • Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit • Count forwards and backwards in whole numbers, including those with 2 decimal places • Flexibly partition numbers with more than 4 digits: $60,017 = 59,000 + 1,117$ • Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • Recognise the place value of each digit in numbers with up to 2 decimal places • Count forwards and backwards in hundredths • Count forwards and backwards with positive and negative whole numbers through zero • Know the complements of whole numbers to 10, 100, 1000 etc 	<p>Associated skills</p> <ul style="list-style-type: none"> • Order negative numbers and use in context • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals. • Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000

<p>Number facts:</p> <ul style="list-style-type: none"> • Use known number facts to calculate with decimals • Use known number facts to add/subtract fractions with the same denominator.
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Progression in written addition		Progression in written subtraction
<p>Children to follow <i>progression in written calculations</i> video tutorials.</p> <p>bit.ly/stmargsaddition</p>		<p>Children to follow <i>progression in written calculations</i> video tutorials.</p> <p>bit.ly/stmargssubtraction</p>

Additional resources

White Rose Maths - fluency, reasoning, problem solving - whiterosemaths.com

Times Table Rockstars - fluency - bit.ly/stmargstrockstars

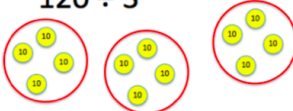
Nrich - reasoning and problem solving - rich.maths.org

Learning by Questions - fluency, reasoning, problem solving - lbq.org

bit.ly/stmargsmathsvideos

<p>NC end of year statements</p> <ul style="list-style-type: none"> • identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 • multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers • multiply and divide numbers mentally drawing upon known facts • divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context • multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 • recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³) • solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes • solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign • solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	<p>Non statutory guidance</p> <p>Pupils practise and extend their use of the formal written methods of short multiplication and short division (see Mathematics Appendix 1). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.</p> <p>They use and understand the terms factor, multiple and prime, square and cube numbers. Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding</p> <p>Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.</p> <p>Distributivity can be expressed as $a(b + c) = ab + ac$.</p> <p>They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$).</p> <p>Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5x$)</p>
<p>Pre-requisite skills</p> <p>Count forwards and backwards in steps of powers of 10 for any given number up to 1,000,000</p> <p>Round numbers to the nearest 10, 100, 1000, 10 000 and 100 000</p>	<p>Associated skills</p> <ul style="list-style-type: none"> • round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • Recognise and identify multiples, factors and prime numbers • identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 • recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)

Number facts: Know all multiplication and division facts up to 12 x 12 and use these in a variety of calculations, including numbers with decimals

MULTIPLICATION	OPPORTUNITIES FOR PROBLEM SOLVING	DIVISION
Progression in mental multiplication		Progression in mental division
Use known doubling facts to calculate doubles of 2 digit numbers Work out times tables 16 times table from 8 times table Double any multiple of 5 up to 500	<p>Missing numbers $6 \times 0.9 = \square \times 0.03$</p> <p>$6 \times 0.04 = 0.008 \times \square$ Which numbers could be written in the boxes?</p> <p>Making links Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?</p> <p>Use a fact $3 \times 75 = 225$ Use this fact to work out $450 \div 6 =$ $225 \div 0.6 =$</p> <p>To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve 48×25 78×25 4.6×25</p> <p>Making links $7 \times 8 = 56$ How can you use this fact to solve these calculations? $0.7 \times 0.8 =$ $5.6 \div 8 =$</p> <p>Prove It What digits go in the boxes?</p> $12 \square 3 \div 6 = 212$ $12 \square 3 \div 7 = 212$ $22 \square 3 \div 7 = 321 \text{ r } 6$ $323 \times \square 1 = 13243$ Can you prove it?	<p>Use knowledge of place value and known facts to divide numbers mentally drawing upon known facts:</p> <p>$120 \div 3$</p>  <p>$3 \overline{) 120}$</p> <p>Divide a 4 digit multiple of 100 by 1000, 100 or 10 $8200 \div 100$ $3600 \div 10$ Divide whole numbers with decimals by 10, 100 and 1000 Halve any 3 digit multiple of 10 $150 \div 2$ $370 \div 2$ Find sixths by halving thirds</p>
Develop strategies for multiplication such as doubling one side and halving the other $35 \times 14 = 70 \times 7$		
Multiply by 19 or 21 by multiplying by 20 and adjusting		
Calculate TU x U by calculating the tens first 47×5 40×5 and then 7×5		
Use knowledge of a known fact to derive other facts $23 \times 3 = 69$, you also know $3 \times 23 = 69$, $69 \div 3 = 23$ and $69 \div 23 = 3$		
Know the relationship between multiplication and fractions: if $12 \times 6 = 72$, then $1/6$ of 72 = 12 and $1/12$ of 72 is 6		
Multiply a 2 digit multiple of 10 by a 3 digit multiple of 10 or 100 30×400		
Multiply a 2 digit multiple of 10 or a 3 digit multiple of 100 by a U 400×9		
Multiply a 2 digit whole number by any U crossing the tens boundary 24×3		

Progression in written multiplication		Progression in written division
<p>Children to follow <i>progression in written calculations</i> video tutorials.</p> <p>bit.ly/stmargsmultiplication</p>	<p>Always, sometimes, never? Is it always, sometimes or never true that multiplying a number always makes it bigger Is it always, sometimes or never true that prime numbers are odd.</p> <p>Is it always, sometimes or never true that when you multiply a whole number by 9, the sum of its digits is also a multiple of 9</p> <p>Is it always, sometimes or never true that a square number has an even number of factors.</p> <p>Use the inverse Use the inverse to check if the following calculations are correct: $4321 \times 12 = 51852$ $507 \div 9 = 4563$</p> <p>Size of an answer The product of a two digit and three digit number is approximately 6500. What could the numbers be?</p>	<p>Children to follow <i>progression in written calculations</i> video tutorials.</p> <p>bit.ly/stmargsdivision</p>

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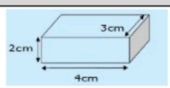
Upper KS2 Maths Organiser

Cube Numbers		Cube Roots	
1^3	1	$\sqrt[3]{1}$	1
2^3	8	$\sqrt[3]{8}$	2
3^3	27	$\sqrt[3]{27}$	3
4^3	64	$\sqrt[3]{64}$	4
5^3	125	$\sqrt[3]{125}$	5

Square Numbers		Square Roots	
1^2	1	$\sqrt{1}$	1
2^2	4	$\sqrt{4}$	2
3^2	9	$\sqrt{9}$	3
4^2	16	$\sqrt{16}$	4
5^2	25	$\sqrt{25}$	5
6^2	36	$\sqrt{36}$	6
7^2	49	$\sqrt{49}$	7
8^2	64	$\sqrt{64}$	8
9^2	81	$\sqrt{81}$	9
10^2	100	$\sqrt{100}$	10
11^2	121	$\sqrt{121}$	11
12^2	144	$\sqrt{144}$	12
13^2	169	$\sqrt{169}$	13

Prime Numbers			
2	17	41	67
3	19	43	71
5	23	47	73
7	29	53	79
11	31	59	83
13	37	61	89

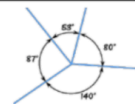
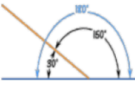
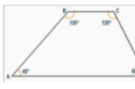
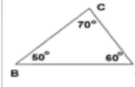
Numbers	
0	a number with no value that comes between the positive and negative numbers
positive number	a number more than 0
negative number	a number less than 0
prime number	A number with exactly two factors, itself and one.
composite number	A number with more than two factors.

Geometry	
volume	
Volume = length x height x depth	

Statistics	
mean	the sum of all data points divided by the number of data points

Circle Geometry	
radius	a straight line from the centre to the circumference
chord	a straight line joining two points on the circumference
diameter	a chord which passes through the centre
circumference	the distance once around the circle

Roman Numerals	
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Angle Totals	
	Angles around a point total 360°
	Angles on a straight line total 180°
	Angles in a quadrilateral total 360°
	Angles in a triangle total 180°

Factors and Multiples	
factors	numbers we multiply together to get other numbers
multiple	the result of multiplying a number by an integer
HCF	Highest Common Factor - the largest factor shared by two or more numbers
LCM	Lowest Common Multiple - the smallest number that is a multiple of two or more numbers.

Multiplication Grid												
X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Place Value Grid											
	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones		tenths	hundredths	thousandths
Numeral	1,000,000	100,000	10,000	1000	100	10	1	●	0.1	0.01	0.001