Portswood Primary School

Progression of skills

Mental calculation

At Portswood Primary Academy Trust, we strive for achievement for all our pupils and believe that all pupils should develop a passion for maths.

We want pupils to be *confident* in their use of maths; being able to *identify* where the *maths* is *in* the *problems* they are *faced* with, to prepare them for its use in the *real world,* and to ensure that they are ready for the *next stage* of their *mathematics education.*

Our *aims* for maths, *reflect* the aims of the *National Curriculum*. Pupils should:
• Become *fluent* in the fundamentals of Maths
• *Reason mathematically*
• *Solve problems*

Pupils, at Portswood Primary School, should have a *secure knowledge of mathematical facts* and be able to *recall* them *rapidly.* Ensuring that pupils *retain* a *knowledge* of number, other mathematical facts or the processes of calculation, will mean they are *not a barrier to use in wider mathematics.*

The following calculation policy has been devised to meet requirements of the National Curriculum for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

Early Maths

Early learning in number and calculation is designed to encapsulate the aims as set out in in Development Matters curriculum guidance for the early years foundation stage. It is designed to build towards meeting the early learning goals in Number and Numerical Patterns .
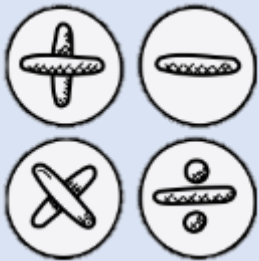
We aim:

Portswood Primary School

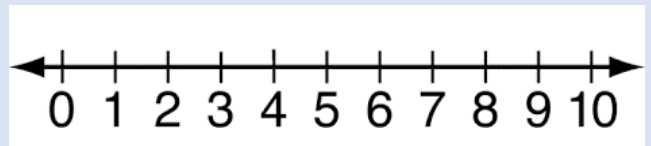|	
Introduce **practical, oral and mental activities**	Develop ways of recording
Learn and use signs and symbols	To build confidence using **practical apparatus** to support mental calculations
Strengthen mental methods	To feel confident using different approaches (e.g. mental, jottings and checking)
To use estimation and checking	To have a secure understanding of number facts

Progression in addition

Portswood Primary School

#		Early years	Year 1	Year 2	Year 3	Year 4 onwards
1	Begin to count forwards					
2	Counting of objects					
3	Continue to count forwards in ones					
4	Comparing quantities more/less					
5	Relate addition to adding					
6	Find one more than					
7	Add using objects					
8	Use + and = for mental addition					
9	Add 1 and 10 to a digit number, including zero					
10	Use of structured number line					
11	Introduction of empty number line					
12	Know addition facts to 10					
13	Count forwards in tens					
14	Known number facts to 20					
15	Relate addition to 'total' 'altogether' 'sum'					
16	Add 10 to single digit number					
17	Add 1 and 10 to two digit number					
18	Add three or more 1 digit numbers					
19	Add multiples of 10					
20	Know addition facts to 100					
21	Add multiples 100					
22	Mental addition strategies					
23	Fluent and flexible use of appropriate methods based on numbers involved					
24	Expanded column method					
25	Column method (no exchange)					
26	Column method (with exchange)					
27	Count on in decimals					

Progression in subtraction

Portswood Primary School

		Early Years	Year 1	Year 2	Year 3	Year 4 onwards
1	**Begin to count backwards**					
2	Continue the count back in ones					
3	Comparing quantities more/less (fingers/objects)					
4	Relate subtraction to taking away					
5	Find one less than					
6	Subtract single digit numbers with objects					
7	Use structured number line					
8	Use - and = for mental subtraction					
9	Subtract single digit numbers					
10	Subtraction facts to 10 and 20					
11	Find difference by counting up					
12	Subtract 1 from two digit number					
13	Use empty number line to subtract (Early years and Year 1)					
14	Count back in tens					
15	Partition number to be subtracted					
16	Begin to partition to take away					
17	Subtract 10 from two digit numbers					
18	Subtract multiples of 10, 100, 1000					
19	Count back in hundreds					
20	Expanded method					
21	Fluent and flexible use of appropriate methods based on numbers involved					
22	Standard written method					
23	Exchanging across zero					
24	Subtract decimals in context					

Progression in multiplication

Portswood Primary School

#		Early Years and Year 1	Year 2	Year 3	Year 4	Year 5 onwards
1	Begin to sort objects into groups/size/colour etc					
2	Using objects to calculate					
3	Begin to count in 2's 5's (early years) and 10's (Year 1 onwards)					
4	Begin to relate repeated addition to multiplication					
5	Use related vocabulary, x and = (group size, number of groups, total)					
6	Recall doubles to 20					
7	Begin to count using groups of the same size					
8	Arrays using pictures					
9	Use known facts to support mental calculations					
10	Mental recall of multiplication facts (12 x 12)					
11	Multiplication of whole numbers by 10 (year 3) /100/1000 (Year 4 onwards)					
12	Partitioning of numbers for calculation					
13	Multiplication of single digit by multiple of 10					
14	Fluent and flexible use of appropriate methods based on numbers involved					
15	Short multiplication by a single digit (up to 4 digit number)					
16	Expanded long multiplication					
17	Multiplication of decimal numbers by 10/100/1000					
18	Multiple of 10 by multiple of 10					
19	Long multiplication by two-digit numbers					
20	Long multiplication with decimals					

Progression in division

Portswood Primary School

#		Early years and Year 1	Year 2	Year 3	Year 4	Year 5 onwards
1	Share objects into equal groups					
2	Relate division to sharing and grouping					
3	Use ÷ and = signs that objects/items are equally shared using related vocabulary (group size, number of groups, total)					
4	Begin to relate repeated subtraction to division.					
5	Sharing circles with dots					
6	Halving even numbers					
7	Counting in multiples of 2, 5, 10					
8	Link to multiplication: Grouping – relate division to multiplication by using arrays (visual and concrete)					
9	Use known multiplication facts to support mental division calculations Repeated subtraction on a number line					
10	Sharing circles with remainders					
11	Counting in multiples of 3, 4					
12	Mental recall of division facts (12 x 12)					
13	Fluent and flexible use of appropriate methods based on numbers involved					
14	Division of whole numbers by 10/100/1000					
15	Long division (chunking)					
16	Whole number remainders					
17	Halving by partitioning (including decimals)					
18	Division of decimal numbers by 10/100/1000					
19	Short division for division by a single digit (up to four digit)					
20	Remainders in context (Rounding up/down)					
21	Remainders as quotients (fractions)					
22	Remainders as decimals					
23	Expanded long division					
24	Formal written method for long division					

Early Years	Recall	Mental method
3 & 4 year olds	Fast recognition of up to 3 objects, without having to count them individually ('subitising').	• Discovery time provision in Autumn term
	Recite numbers past 5.	• Hello time *e.g. Number of boys/ girls/ total* • Counting songs *e.g. '1,2,3,4,5, once I caught a fish alive…'*
	Say one number for each item in order: 1,2,3,4,5.	• Daily provision such as counting how long it takes to do something *e.g. how many times can you bounce a ball*
	Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').	• Hello time *e.g. Number of boys/ girls/ total* • Rainbow time – *counting skills* • Discovery time provision
	Show 'finger numbers' up to 5.	• Hello time *e.g. Number of boys/ girls/ total*

Early Years	Recall	Mental method
3 & 4 year olds	Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.	• Hello time *e.g. Number of boys/ girls/ total* • Find numeral on a number line • Matching numerals to numicon, objects
	Experiment with their own symbols and marks as well as numerals.	• Summer term focus – number formation
	Solve real world mathematical problems with numbers up to 5.	• Discovery time contextual problems *e.g. 'post' can you make sure post gets to the right houses?*
	Compare quantities using language: 'more than', 'fewer than'.	• Hello time *e.g. Number of boys/ girls/ total* • Rainbow time – *counting 'more than', 'fewer than'*

Early Years	Recall	Mental method
Reception	Count objects, actions and sounds.	• Songs • Physically moving *(e.g. clapping and stomping)*
	Subitise	• Physical resources • Showing number/ amounts in different ways
	Link the number symbol (numeral) with its cardinal number value.	• Repetition of modelling • Use of number line • Careful counting • Matching to symbols
	Count beyond ten.	• Repetition • Physical resources • Introducing each number individually • Numicon
	Compare numbers.	• Know numbers • Use of position on number • Grab hands • Physical resources

Early Years	Recall	Mental method
Reception	Understand the 'one more than/one less than' relationship between consecutive numbers	• Number line • Missing number line • Physical resources • Large scale number line – kids jumping
	Explore the composition of numbers to 10.	• Numicon • Coat hangers maths • Multilink • Physical resources • Nursery rhymes • Number blocks
	Automatically recall number bonds for numbers 0–10.	• Understanding composition & number • Visual clues • Incident moments • Sleeping fingers

Early Years	Recall	Mental method
Early Learning goal	**Number:** Children at the expected level of development will: • Have a deep understanding of number to 10, including the composition of each number; • Subitise (recognise quantities without counting) up to 5; • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.	**See previous**
	Numerical Patterns: Children at the expected level of development will: • Verbally count beyond 20, recognising the pattern of the counting system; • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity; • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	• Hundred squares • Looking at units in 2-digit numbers • Visual representations - Even/ odd – buses - Doubles – ladybirds - Sharing circles – sharing - Physical resources

Year 1	Recall	Mental method
Counting	Count on in 1s from 0 to 100 from any given number	• Chanting – whole class • Number lines • 100 squares
Number bonds	Recall number bonds and addition and subtraction facts to 20 Given a number, identify one more and one less	• Interactive games *(smoothie maker – whole class)* • Chanting • Recall of the 2 numbers • Using fingers *(number bonds to 10)* • Through knowledge of number to 100
Partitioning/ place value	Understand the value of each digit (up to 2 digit numbers)	• Representation of partitioning
Adding Subtracting	Add and subtract within 20	• Physical 10s frame • Structured number line • Empty number line

Year 1	Recall	Mental method
X-tables	Begin to count in multiples of 2,5 and 10	• Chanting
Doubling/ halving	Find half as one of two equal parts of an object, shape or quantity	• Visual representations • Links to division – sharing circles • Links to multiplication – arrays
Estimation	Estimate with increasing accuracy number of objects to about 30	• Visual representations • Contextual links – e.g. measurement
Other	Time to the hour and half past the hour and days/ weeks, months	• Practical uses of clocks • Songs – days and months

Year 2	Recall	Mental method
Counting	Count in multiples of 2, 3, 5 and 10 Count on and back in 10s from any given number	• Regular counting using 100 squares *(physical and interactive)* • Number line • Place value knowledge of numbers to 100
Number bonds	Recall and use addition and subtraction facts to 20 Derive and use related facts up to 100 E.g. 3+7 = 10 so 30 add 70 - 100	• Prior knowledge – number bonds to 10 • Numicon • Regular practice
Partitioning / place value	Recognise the place value of each digit in a two digit number Flexible partition 2 digit numbers in different ways e.g. 23 = 20 + 3 = 10 + 13	• Dienes • Partitioning *(physically and pictorially)* • Different representations of partitioning
Adding Subtracting	Add and subtract 2 digit number by one digit by counting back and counting on Add three single digit numbers	• Concrete apparatus • Use of fingers • "Counting on…" encouraging mental counting on with number in head • Partitioning

Year 2	Recall	Mental method
X-tables	Recall and use multiplication and division facts for the 2,5 and 10 multiplication	• Flash cards to support mental methods • Encourage repeated addition
Doubling/ halving	Double and halve to 50 (double 25 and half of 50) linked to x2	• Link to 2x table • Link to fractions • Visual representations
Estimation	Estimate with increasing accuracy number of objects to about 50 Round numbers less than 100 to the nearest 10	• Visual representations • Contextual links – e.g. measurement
Other	Compare and order numbers from 0 – 100 Recognise odd and even numbers Recognise Time – quarter past and to and half past the hour	• Prior place value knowledge • Songs – regular practice • Stem sentences

Year 3	Recall	Mental method
Counting	Count in multiples of 3, 4, 8, 50 and 100 from 0 Given a number, identify 10 or 100 more or less	• Prior knowledge counting in 2, 5 and 10s • Counting from 0 and other starting points • Regular practice • Place value knowledge • Modelling correct columns to increase/ decrease correct changing values
Number bonds	Recall addition and subtraction bonds to 50 (to support money problems) Addition and subtraction of multiples of 10, 100 and 1000	• Prior knowledge of number bonds to 10 and 20 • Using known number facts • Counting in 10s and 100s • Place value knowledge
Partitioning/ place value	Recognise the place value of each digit in a three digit number Partition 3 digit numbers in different ways	• Prior knowledge of 2 digits • Different representations *(concrete/ pictorial)* • Physical resources • Regular practice
Adding Subtracting	Add and subtract 3 digit number by ones, tens and 100s	• Knowledge of place value • Encourage mental calculations within formal methods

Year 3	Recall	Mental method
X-tables	Recall and use multiplication and division facts for 3,4 and 8 multiplication tables Use commutative law to support mental methods X and divide by 10	• Prior knowledge of 2,5 and 10 x-table • Counting in/ forwards/ backwards • Counting from different starting points • Visual representations • Pictorial examples *(e.g. arrays)* • Place value knowledge
Doubling/ halving	Double and halve to 100	• Link to 2x table • Link to fractions • Visual representations
Estimation	Estimate number of objects to about 100	• Visual representations • Number lines
Other	Compare and order numbers to 1000 Understand inverse operations Recognise time	• Place value knowledge • Understanding of inverse • Stem sentences • Physical resources • Interactive games

Year 4	Recall	Mental method
Counting	Count in multiples of 6, 7, 9, 11, 12, 25, and 1000 Given a number, identify, 10, 100 and 1000 more or less Count backwards through zero to include negative numbers	• X-table knowledge • Chanting in 25s • Place value knowledge • Number line *(vertical and horizontal)*
Number bonds	Recall addition and subtraction bonds 100 / 500 (to support real life money problems) Addition and subtraction of multiples of 10, 100 and 1000	• Place value knowledge • Sequencing
Partitioning/ place value	Recognise the place value of each digit in a four digit number	• Place value counters
Adding Subtracting	Add and subtract 4 digit number by ones, tens, hundreds and thousands	• Knowledge of place value • Encourage mental calculations within formal methods

Year 4	Recall	Mental method
X-tables	Recall and use multiplication and division facts for multiplication tables up to 12x12 X and divide one and two digit numbers by 10 and 100 Know multiplication facts (4 x 6 = 24, 40 x 6 = 240, 400 x 6 = 2400, 2400 / 6 = 400, 2400 / 60 = 4)	• X-table games • Recall of known facts • Place value sliders • Scaling
Doubling/ halving	Doubles and halves to 1000	• Link to 2x table • Link to fractions • Visual representations
Estimation	Estimate a number of objects to about 250 Round 3 digit numbers to the nearest 10 or 100	• Rhymes • Number lines with multiples • Visual representations
Other	Compare and order numbers beyond 1000 Understand inverse operations Recognise time	• Place value knowledge • Times table knowledge • Counting in 5s • Visual representations • Interactive resources

Year 5	Recall	Mental method
Counting	Count forwards and backwards in steps of 10, 100, 1000 for any given number up to 1 million Count forwards and backwards with positive and negative whole numbers, including through zero	• Place value knowledge • Visual representations • Number line
Number bonds	Addition and subtraction facts to 1 with two decimal places Addition and subtraction of multiples of 10, 100 and 1000 Square numbers up to 12 , cube numbers 2,3, 4 and 5 prime numbers	• Knowledge of number bonds to 10 and 100 • Knowledge of place value • Timetable knowledge • Factors
Partitioning/ place value	Recognise the value of each digit in 6 digit number up. Identify the value of each digit to 2 decimal places	• Place value knowledge • Fractions
Adding Subtracting	Add and subtract numbers mentally with increasingly larger numbers.	• Mental partitioning of one or two • Adjustment

Year 5	Recall	Mental method
X-tables	Multiply and divide numbers mentally by drawing on known facts X and divide whole numbers and decimals by 10, 100 and 1000 Use multiplication and division facts for solving percentage, decimal and fraction calculations	• Secure knowledge with doubles, progressing onto 4s and then 8s • Times table knowledge • Carefully selected questions to show relationships $158 \div 10 = (\div 100, \div 1000)$ • Knowing key facts
Doubling/ halving	Doubles and halves for any given number	• Doubling with even numbers • Halving with even numbers • Place value knowledge
Estimation	Estimate in real life contexts e.g. how many slices of bread in a thick sliced loaf Round 2,3 and 4 digit numbers to the nearest 10, 100 or 1000	• Benchmark • Key facts • Progressing from written to mental methods
Other	Compare and order numbers beyond 1000 Understand inverse operations Recognise time on 24hr clock	• Knowledge of place value • Knowing key number facts and number relationships • Reading and drawing time • Visual representations

Year 6	Recall	Mental method
Counting	Count forwards and backwards in steps of 10, 100, 1000 for any given number up to 1 million Count forwards and backwards with positive and negative whole numbers, including through zero	• Place value knowledge • Stem sentences • Visual representations
Number bonds	Addition and subtraction facts to 1 with two decimal places Addition and subtraction of multiples of 10, 100 and 1000 Square numbers up to 12 , cube numbers 2,3, 4 and 5 prime numbers	• Knowledge of number bonds to 10 and 100 • Knowledge of place value • Timetable knowledge • Factors
Partitioning/ place value	Recognise the value of each digit in 6 digit number up. Identify the value of each digit to 2 decimal places Identify the value of each digit to 3 decimal places	• Place value knowledge • Links to fractions • Rhymes • Verbal reiterating
Adding Subtracting	Add and subtract numbers mentally with increasingly larger numbers.	• Mental partitioning of one or two • Adjustment

Year 6	Recall	Mental method
X-tables	Multiply and divide numbers mentally by drawing on known facts X and divide whole numbers and decimals by 10, 100 and 1000 Perform mental calculations including with mixed operations and large numbers Use multiplication and division facts for solving percentage, decimal and fraction calculations	• Encouraging use of squares to avoid being reliant on column names • Links to fractions, percentages and decimals • Times table knowledge • Visual representations
Doubling/ halving	Doubles and halves for any given number	• Doubling with even numbers • Halving with even numbers • Place value knowledge • Visual representations
Estimation	Estimate in a more complex contexts e.g. how many bricks in a school building by taking a sample and scaling Round any whole number to the nearest multiple of 10, 100 or 1000	• Prior knowledge of basic weights and measures • Key facts • Progressing from written to mental methods
Other	Compare and order numbers beyond 1000 Understand inverse operations Recognise time on 24hr clock	• Knowledge of place value • Knowing key number facts and number relationships • Reading and drawing time • Visual representations