Calculation Policy

Name of School	Petersgate Infant School
Date of review	January 2024
Date of next review	January 2025
Reviewed by	Chloe Lindsell Maths lead

School Vision

"for all children to grow into responsible, caring individuals who actively and positively contribute to the community."

At Petersgate Infant School, our vision outlined above is strengthened by our values of safety, caring, achievement, resilience and friendship. These values symbolise warmth, community and cohesion to ensure we are "working together to achieve our best".

As a school, we can apply these values through the following aims:

Aims

- Ensuring everyone stays healthy and safe.
- Ensuring everyone feels valued and has a sense of belonging.
- Providing a high quality learning environment.
- Helping everyone enjoy learning and achieving their best.
- Nurturing and developing the whole child.
- Ensuring everyone makes a positive contribution to the school and wider community.

Safeguarding at Petersgate Infant School is carried out in line with the statutory guidance in 'Keeping Children Safe in Education' published by the Department for Education.

Mathematics is essential for everyday life and understanding our world. It enables the development of pupils' natural ability to think logically and solve puzzles and real life problems. Pupils learn to think creatively and make links between mathematical concepts through exploring patterns in the number system, shape, measures and statistics. They make and discuss propositions, explaining their reasoning and justifying their answers. They develop the skills, knowledge and efficient methods of calculation necessary to support their economic future and problem solving in life.

At Petersgate Infant School, our maths curriculum follows the Hampshire scheme of learning. This follows a spiral curriculum approach which allows concepts to be revisited throughout the year. The policy provides guidance on appropriate formal written calculation methods and progression in all four operations: addition, subtraction, multiplication and division. Within each specific area there is a progression of skills, knowledge and layout for written methods. The calculation strategies which will be used will reflect the ideology of moving from concrete to pictorial and then abstract recording leading to more formal written methods. This policy focuses on the progression upon the formal calculation strategies but manipulative resources and visual representations of a concept are used alongside these formal strategies to allow pupils to develop both a conceptual and a procedural understanding of a mathematical concept. Mental methods and strategies will work in partnership with these methods.

In Key stage 1, domains (place value, addition and subtraction, multiplication and division, fractions, measures, geometry, position and direction) are taught in three phases across Years 1 and 2.

- Phase 1 from September to November.
- Phase 2 from November to January
- Phase 3 February to April.

These phases are indicated as stages in our calculation policy. However, whist the policy below gives an indication of the rate at which we would expect the children the progress with their calculation, teachers are familiar with previous year groups and ensure that children are secure with concepts and strategies before taking the next steps in their mathematical journey when they are ready to do so.

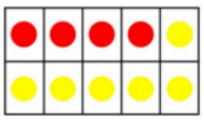
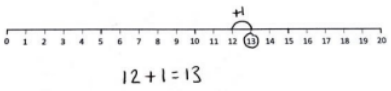
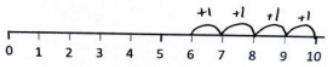
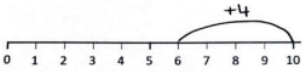
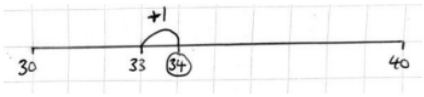
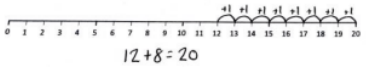
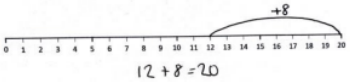
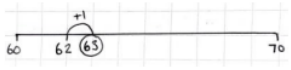
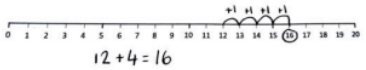
Early Years

In Early Years developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Addition

Addition – Year 1

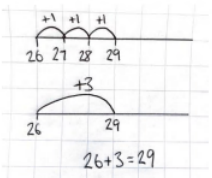
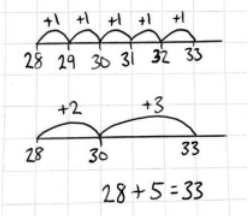
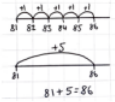
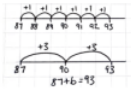
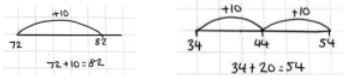
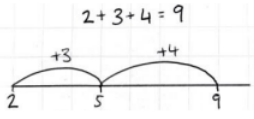
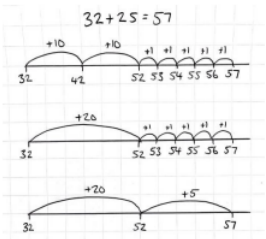
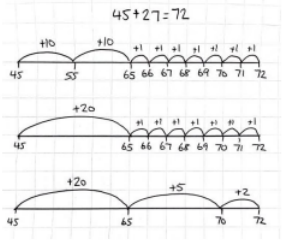
Selected National Curriculum Programme of Study Statements Pupils should be taught to: • represent and use number bonds and related subtraction facts within 20. • add and subtract 1-digit and 2-digit numbers to 20, including 0.	**The Big Ideas (NCTEM)** Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given 8 + 7, thinking of 7 as 2 + 5 and adding the 2 to 8 to make 10 and then the 5 to total 15. Thinking of part whole relationships is helpful in linking addition and subtraction. For example, where the whole is 6, and 4 and 2 are parts. This means that 4 and 2 together form the whole, which is 6 and 6 subtract 4 leaves the 2 and 6 subtract 2 leaves the 4.

Stage 1	Stage 2	End of Year Expectation
Represent number bonds within 10. 4 + 6 = 10  'Contains material developed by NCETM and licensed under Open Government Licence v3.0' http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ Find 1 more from any given number within 20.  	Use number bonds within 10.   Find 1 more from any given number within 50. 	Represent and use number bonds within 20.   Find 1 more from any given number within 100.  Add 1-digit and 2-digit numbers to 20. 

Linked to Hampshire Scheme of Learning Units 1.1, 1.2, 1.4, 1.5, 1.7, 1.8, 1.9 and 1.12.

Addition – Year 2

Selected National Curriculum Programme of Study Statements
Pupils should be taught to:
• recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.
• add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  ○ a 2-digit number and ones
  ○ a 2-digit number and tens
  ○ two 2-digit numbers
  ○ adding three 1-digit numbers
	The Big Ideas (NCTEM)
	Understanding that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. For example, given 3 + 8 it is easier to calculate 8 + 3. When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given 5 + 8 + 2 it is easier to add 8 + 2 first than to begin with 5 + 8. Understanding the importance of the equals sign meaning 'equivalent to' (i.e. that 6 + 4 = 10, 10 = 6 + 4 and 5 + 5 = 6 + 4 are all valid uses of the equals sign) is crucial for later work in algebra. Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.

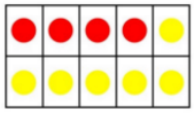
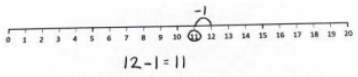
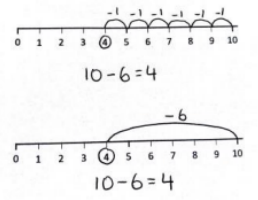
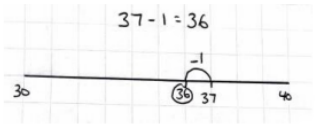
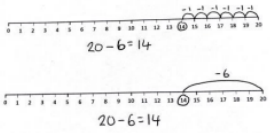
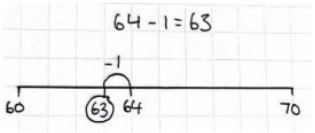
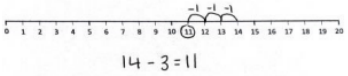
Stage 1	Stage 2	End of Year Expectation
Add 2-digit numbers and ones to 50 without bridging.  Add 2-digit numbers and ones to 50 with bridging.  	Add 2-digit numbers and ones to 100 without bridging.  Add 2-digit numbers and ones to 100 with bridging.  Add 2-digit and tens.  Adding three 1-digit numbers.  	Adding two 2-digit numbers without bridging.  Adding two 2-digit numbers with bridging. 

Linked to Hampshire Scheme of Learning Units 2.1, 2.2, 2.4, 2.5, 2.7, 2.8, 2.9 and 2.12.

Subtraction

Subtraction – Year 1

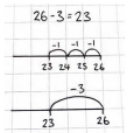
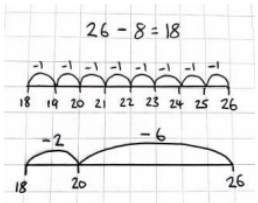
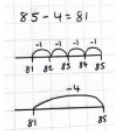
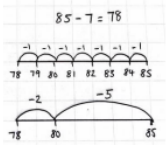
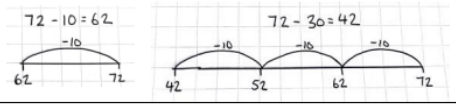
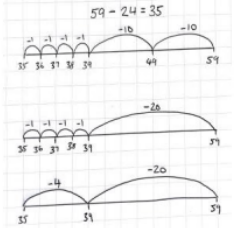
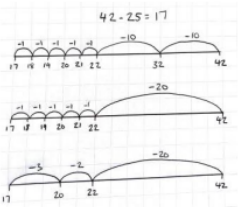
Selected National Curriculum Programme of Study Statements Pupils should be taught to: • represent and use number bonds and related subtraction facts within 20 • add and subtract 1-digit and 2-digit numbers to 20, including 0	**The Big Ideas (NCTEM)** Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given 8 + 7, thinking of 7 as 2 + 5 and adding the 2 to 8 to make 10 and then the 5 to total 15 Thinking of part whole relationships is helpful in linking addition and subtraction. For example, where the whole is 6, and 4 and 2 are parts. This means that 4 and 2 together form the whole, which is 6 and 6 subtract 4 leaves the 2 and 6 subtract 2 leaves the 4.

Stage 1	Stage 2	End of Year Expectation
Represent number bonds within 10. 10 – 6 = 4  'Contains material developed by NCETM and licensed under Open Government Licence v3.0' http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ Find 1 less from any given number within 20. 	Use number bonds within 10.  Find 1 less from any given number within 50. 	Represent and use number bonds within 20.  Find 1 less from any given number within 100.  Subtract 1-digit and 2-digit numbers within 20. 

Linked to Hampshire Scheme of Learning Units 1.1, 1.2, 1.4, 1.5, 1.7, 1.8, 1.9 and 1.12.

Subtraction – Year 2

Selected National Curriculum Programme of Study Statements Pupils should be taught to: • recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • add and subtract numbers using concrete objects, pictorial representations, and mentally, including: ○ a 2-digit number and ones ○ a 2-digit number and tens ○ two 2-digit numbers ○ adding three 1-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot	**The Big Ideas (NCTEM)** Understanding that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. For example, given 3 + 8 it is easier to calculate 8 + 3. When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given 5 + 8 + 2 it is easier to add 8 + 2 first than to begin with 5 + 8. Understanding the importance of the equals sign meaning 'equivalent to' (i.e. that 6 + 4 = 10, 10 = 6 + 4 and 5 + 5 = 6 + 4 are all valid uses of the equals sign) is crucial for later work in algebra. Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.

Stage 1	Stage 2	End of Year Expectation
Subtract 2-digit numbers and ones with numbers to 50 without bridging.  Subtract 2-digit numbers and ones to 50 with bridging. 	Subtract 2-digit numbers and ones to 100 without bridging.  Subtract 2-digit numbers and ones to 100 with bridging.  Subtract 2-digit numbers and tens. 	Subtract two 2-digit numbers without bridging.  Subtract two 2-digit numbers with bridging. 

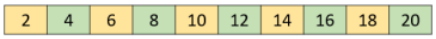
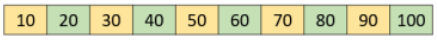
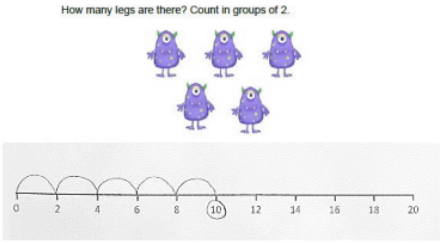
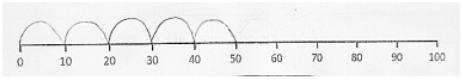
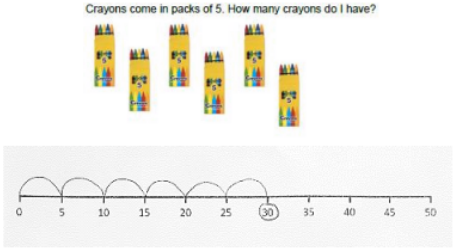
Linked to Hampshire Scheme of Learning Units 2.1, 2.2, 2.4, 2.5, 2.7, 2.8, 2.9 and 2.12.

Multiplication

Multiplication – Year 1

Selected National Curriculum Programme of Study Statements	The Big Ideas (NCETM)
Pupils should be taught to: • count in multiples of twos, fives and tens. • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	Counting in steps of equal sizes is based on the big idea of 'unitising'; treating a group of, say, five objects as one unit of five. Working with arrays helps pupils to become aware of the commutative property of multiplication, that 2 × 5 is equivalent to 5 × 2

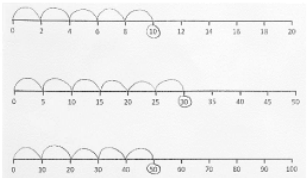
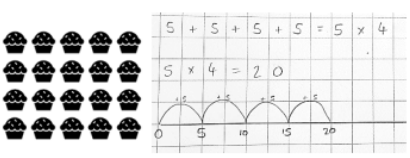
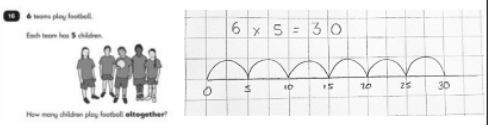
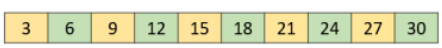
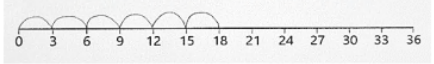
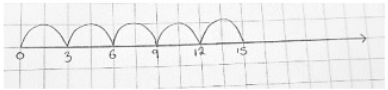
Please note that manipulatives and visual representations may be used alongside more formal recording as appropriate. It is important for pupils to explore structure and understand a concept before developing a more procedural approach, at which point all representations may be used alongside each other.

Stage 1	Stage 2	End of Year Expectation
Count in multiples of twos Number track 	**Count in multiples of tens** Number track 	**Count in multiples of fives** Number track
Solve one step multiplication, by calculating the answer using pictorial representations (twos) Structured number line, e.g: 	**Solve one step multiplication, by calculating the answer using pictorial representations (tens).** Structured number line, e.g: *There are 10 crayons in a box.* *How many crayons will I have if I buy 5 boxes?* 	**Solve one step multiplication, by calculating the answer using pictorial representations (fives).** Structured number line, e.g: 

Multiplication – Year 2

Selected National Curriculum Programme of Study Statements	The Big Idea (NCETM)
Pupils should be taught to: • count in steps of two, three, and five from 0, and in tens from any number, forward and backward. • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. • solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in context.	It is important that pupils both commit multiplication facts to memory and also develop an understanding of conceptual relationships. This will aid them in using known facts to work out unknown facts and in solving problems. Pupils should look for and recognise patterns within tables and connections between them (e.g. 5× is half of 10×). Pupils should recognise multiplication and division as inverse operations and use this knowledge to solve problems. They should also recognise division as both grouping and sharing.

Please note that manipulatives and visual representations may be used alongside more formal recording as appropriate. It is important for pupils to explore structure and understand a concept before developing a more procedural approach, at which point all representations may be used alongside each other.

Stage 1	Stage 2	End of Year Expectation
Count in steps of two, five from 0 and in tens from any number, forward and backward. Structured number line. 	**Solve problems involving multiplication using repeated addition.** Unstructured number line, e.g *How many muffins are there altogether?* 	**Recall and use multiplication facts for the 2, 5 and 10 multiplication tables.** Unstructured number line to 'prove it'  'Contains KS1 SATs materials licensed under Open Government Licence v3.0 Open Government Licence (nationalarchives.gov.uk)
Count in steps of 3. Number track 	**Count in steps of 3.** Structured number line, e.g. *Tilly ran 3 miles every day.* *How many miles has she run after 6 days?* 	**Count in steps of 3.** Unstructured number line 

Division

Division – Year 1

Selected National Curriculum Programme of Study Statements Pupils should be taught to: • count in multiples of twos, fives and tens. • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	**The Big Ideas (NCETM)** Counting in steps of equal sizes is based on the big idea of 'unitising'; treating a group of, say, five objects as one unit of five. Working with arrays helps pupils to become aware of the commutative property of multiplication, that 2 × 5 is equivalent to 5 × 2

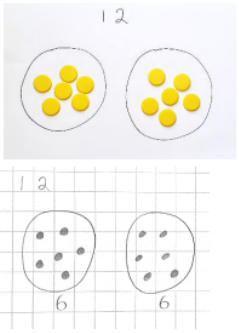
Please note that manipulatives and visual representations may be used alongside more formal recording as appropriate. It is important for pupils to explore structure and understand a concept before developing a more procedural approach, at which point all representations may be used alongside each other.

Stage 1

Making equal groups – sharing.

Concrete objects and pictorial representations, e.g:

I have 12 sweets and share them between myself and a friend (2 people), how many will we each have?



"If I share **12** equally between **2** groups, there will be **6** in each group."

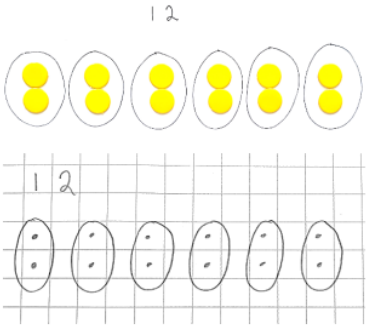
Stage 2

Making equal groups – grouping.

Concrete objects and pictorial representations, e.g:

I have 12 cookies to put in bags.

If I put 2 in each bag how many bags will I need?



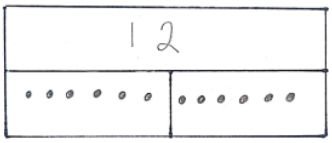
"There are **12** altogether. There are **6** equal groups of **2**."

End of Year Expectation

Making equal groups (including finding half of a quantity).

Bar models, e.g:

I had 12 grapes and I ate half. How many are left?



"There are **12** altogether. They are shared into **2** equal groups. There are **6** in each group. Each group is half of the whole. I know that there are **6** grapes left."

Linked to Hampshire Scheme of Learning Units 1.3, 1.6 and 1.8

Division – Year 2

Selected National Curriculum Programme of Study Statements Pupils should be taught to: • count in steps of two, three, and five from 0, and in tens from any number, forward and backward. • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. • solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	**The Big Idea (NCETM)** It is important that pupils both commit multiplication facts to memory and also develop an understanding of conceptual relationships. This will aid them in using known facts to work out unknown facts and in solving problems. Pupils should look for and recognise patterns within tables and connections between them (e.g. 5× is half of 10×). Pupils should recognise multiplication and division as inverse operations and use this knowledge to solve problems. They should also recognise division as both grouping and sharing. The recognition of pattern in multiplication helps pupils commit facts to memory, for example doubling twice is the same as multiplying by four, or halving a multiple of ten gives you the related multiple of five

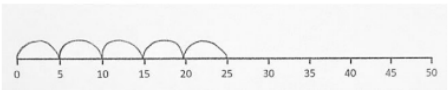
Please note that manipulatives and visual representations may be used alongside more formal recording as appropriate. It is important for pupils to explore structure and understand a concept before developing a more procedural approach, at which point all representations may be used alongside each other.

Stage 1

Count on in steps of two, three and five from 0.

Skip counting on a structured number line, e.g:

$25 \div 5 = \square$



$25 \div 5 = 6$

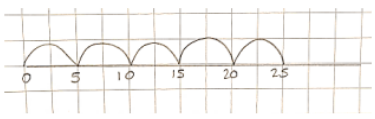
Bar model representation:

Stage 2

Count on in steps of two, three and five from 0.

Skip counting on an unstructured number line, e.g:

$25 \div 5 = \square$



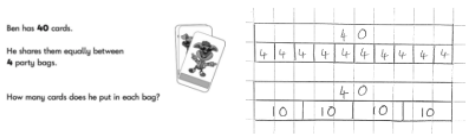
$25 \div 5 = 6$

Bar model representation:

End of Year Expectation

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables.

Number line or bar model to 'prove it'



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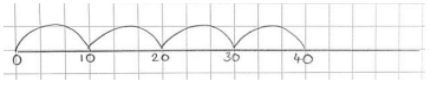
"If I know that 4 x 10 = 40, then I know 40 ÷ 4 = 10".