

Broomlands Primary School

Approach to the Teaching, Learning &  
Assessment of Numeracy and Mathematics



COURAGE COMPASSION CONNECTION

## Introduction

We know that maths and numeracy have a central place in the learning and life-skills we want for all our children. From the earliest years we want to ensure our children have a positive mind-set about this aspect of the curriculum, encountering learning that they understand, are interested in, and challenges them, alongside knowing its place in the real world and as a valuable tool for the future world of work.

Curriculum for Excellence recognises that “Mathematics is important in our everyday life, allowing us to make sense of the world around us and to manage our lives. Using mathematics enables us to model real-life situations and make connections and informed predictions. It equips us with the skills we need to interpret and analyse information, simplify and solve problems, assess risk and make informed decisions.

Mathematics plays an important role in areas such as science or technologies, and is vital to research and development in fields such as engineering, computing science, medicine and finance. Learning mathematics gives children and young people access to the wider curriculum and the opportunity to pursue further studies and interests.

Being numerate helps us to function responsibly in everyday life and contribute effectively to society. It increases our opportunities within the world of work and establishes foundations which can be built upon through lifelong learning. Numeracy is not only a subset of mathematics; it is also a life skill which permeates and supports all areas of learning, allowing young people access to the wider curriculum.”

At Broomlands we value:

- Positive learning experiences that help promote a grown mind set in maths and numeracy
- A broad range of experiences across a year
- Maths and numeracy being a daily learning priority
- A variety of teaching, learning and assessment approaches being used
- Opportunities to apply skills in different ways and promote creativity
- Supporting learners to think, talk and record mathematically
- Use of concrete, pictorial/representative & abstract materials throughout all classrooms
- Promoting use of mathematical language from the early level
- Use of assessment evidence to inform next steps
- A positive ethos
- Teaching children to celebrate their successes and value their mistakes as part of their journey

In practice we:

- Reference the 12 Point Plan (below) to inform practice
- Use a year plan informed by the rolling programme
- Build mental agility and number fluency into learning experiences, wherever appropriate
- Create opportunities for children to articulate their learning strategies, including through the ‘Number Talks’ approach
- Use flexible groupings of pupils to support differentiated levels of learning
- Use progressions to inform teaching, learning and assessment
- Provide clear and purposeful teaching of problem solving strategies
- Use a range of assessment strategies, including use of ‘rich tasks’
- Use trackers to ensure progress and help identify next steps
- Use concrete, pictorial/representative & abstract materials throughout all classrooms
- Reflect on the Cheviot Teaching and Learning toolkit to support approaches

## Planning for teaching and learning

Our starting point in planning is to consider the needs of the children in front of us as we seek to deliver the experiences and outcomes relevant for them in a relevant, engaging and challenging way. We have a number of tools at our disposal to help us do this. Our 3-year Maths and Numeracy rolling programme (example below) helps ensure breadth, depth and coherence as children progress in their learning. This overview is a suggested guide to the key learning at this stage – it is not prescriptive in terms of time spent on each aspect or when it happens in the year. Our guiding principles in establishing a rolling programme were to ensure that children revisit different aspects of maths and numeracy on a regular basis. The programme helps ensure depth in learning as we plan well-paced, well-ordered coverage of the curriculum. It also ensures children have the opportunity to practise, reinforce and build on previous learning, and that we support them to retrieve and use previously learned knowledge and skills.

Block 1	<b>Place Value</b> <b>1-01a, 1-02a</b> Estimating and checking answers Whole numbers, the importance of zero, link between digit, place and value	<b>Time</b> <b>1-10a, 1-10b, 1-10c</b> 12 hour and links with 24 hour notation Using a calendar Measuring time	<b>Properties of 2D Shapes and 3D Objects</b> <b>1-16a</b> Properties of 2D and 3D shapes
Block 2	<b>Patterns and Relationships</b> <b>1-13a</b> Repeating patterns using variety of media	<b>Number and Number Processes</b> <b>1-03a</b> Mental strategies and written skills for addition, subtraction, multiplication and division	
Block 3	<b>Money</b> <b>1-09a, 1-09b</b> Paying for items and working out change Combinations of notes and coins	<b>Fractions, Decimals and Percentages</b> <b>1-07a, 1-07b, 1-07c</b> Notation and vocabulary associated with fractions Fractions of amounts Using pictorial representations to find simple equivalent fractions	<b>Angle, Symmetry and Transformation</b> <b>1-17a</b> Describe, follow and record routes
Block 4	<b>Data and Analysis</b> <b>1-20a</b> Interpreting data	<b>Measurement</b> <b>1-11a</b> Estimation of length, weight and capacity using appropriate instruments and units	Consolidation

We track learning closely in this aspect of the curriculum using our benchmarked tracking documents (example below) for each child, ensuring we closely monitor progress and identify any gaps in learning. ELC and P1 use the Scottish Borders Council Tracking document. This helps build a picture of progress as we gather evidence to make judgements about attainment of a level as children move through the school.

Focus	First:1	First:2	First:3
Estimation and Rounding	<ul style="list-style-type: none"> <li>Estimate the position of a number on a number line</li> <li>Place numbers on a number line that has 0-20 and then 0-100 and identify mid-point</li> </ul>	<ul style="list-style-type: none"> <li>Round numbers to the nearest 10 within 100</li> <li>Estimate the answer to simple problems using rounding</li> <li>Place numbers on a number line (up to 1000) with tens positions marked and round up/down</li> <li>Estimate a proportion of a quantity</li> </ul>	<ul style="list-style-type: none"> <li>Estimate the answer to a calculation, work out the answer and compare the two using different strategies e.g. doubling</li> <li>Mentally round up/down whole numbers to the nearest 10 and 100 and explain why they have made their choice</li> <li>Use blank number line from 0-1000 with a mid-point and 100s markers, children place a given number on the number line</li> <li>Match an appropriate measurement to my estimate</li> </ul>
Number and Number Processes	<ul style="list-style-type: none"> <li>Recognise the importance of 0 to explain place value to 10s.</li> <li>Give a digit its value.</li> <li>Count forward and backwards to 100 in 10s</li> <li>Count in twos, threes, fours and fives</li> <li>Order five numbers (to 100)</li> <li>Sort numbers into odd/even (to 20)</li> <li>Use place value to split a number and use it practically and in mental calculation 0-100</li> </ul>	<ul style="list-style-type: none"> <li>Recognise the importance of 0 to explain place value to 100s.</li> <li>Give a digit its value.</li> <li>Count forward and backwards to 1000 in 10s and 100s</li> <li>Recognise any odd/even number between 0-1000</li> <li>Using numbers to 1000, identify the number before/after/ between</li> <li>Order five numbers to 1000</li> <li>Use place value to split a number and use it practically and in mental calculation 0-1000</li> </ul>	<ul style="list-style-type: none"> <li>Read, write, order and recite whole numbers to 1000, starting from any number in the sequence</li> <li>Recognise the importance of 0 to explain place value to 1000s: give a digit its value</li> <li>Identify the value of each digit in a whole number with 3 digits e.g. 867 = 800+60+7</li> <li>Order sets of non-consecutive 3 digit numbers from largest – smallest and vice versa</li> <li>Count forward and backwards to 10 000 in 10s, 100s and 1000s</li> <li>Play various tables games to demonstrate their understanding of multiples (2s, 3s, 4s, 5s)</li> <li>Use place value to split a number and use it practically and in mental calculation 0-1000s</li> </ul>
Addition	<ul style="list-style-type: none"> <li>Use mental addition strategies up to 20</li> <li>Know number bonds within 10</li> <li>Solve addition problems up to 20</li> <li>Use a strategy to add numbers up to 20</li> <li>Solve addition calculations to 20</li> <li>Use different ways to add 3 numbers</li> <li>Add the same numbers by doubling them</li> </ul>	<ul style="list-style-type: none"> <li>Know number bonds within 20</li> <li>Use mental strategies for addition within 100</li> <li>Add 9/11 and ask children to explain the steps they used</li> <li>Solve written addition calculations, 2 digit to 2 digit</li> <li>Solve addition problems up to 100</li> <li>Add the same numbers by doubling them and near doubling</li> </ul>	<ul style="list-style-type: none"> <li>Use the correct mathematical vocabulary when discussing the four operations</li> <li>Add a multiple of 10 to a given or 100 to a given number to 1000</li> <li>Add several numbers together within 100</li> <li>Use mental addition strategies to add 2 digit numbers within 100, including bridging</li> <li>Use number bonds to 20</li> <li>Solve written addition calculations, 3 digits to 2 digits</li> <li>Solve addition problems up to 1000</li> <li>Add the same numbers by doubling them and near doubling</li> </ul>
Subtraction	<ul style="list-style-type: none"> <li>Use mental subtraction strategies to find the difference within 20</li> <li>Solve subtraction problems within 20</li> <li>Solve subtraction calculations within 20</li> <li>Explain and use the connection between addition and subtraction</li> <li>Explore inverse operations to check accuracy</li> </ul>	<ul style="list-style-type: none"> <li>Use mental strategies to subtract numbers within 100</li> <li>Subtract 9/11 and ask children to explain the steps they used</li> <li>Solve subtraction calculations within 100</li> <li>Solve subtraction problems within 100</li> <li>Explain and use the connection between addition and subtraction</li> </ul>	<ul style="list-style-type: none"> <li>Subtract a multiple of 10 or 100 from a given number to 1000</li> <li>Use mental strategies to subtract 2 digit numbers within 100, including decomposition</li> <li>Solve subtraction calculations to 1000 including exchanging</li> <li>Solve subtraction problems up to 1000</li> <li>Explain and use the connection between addition and subtraction</li> </ul>

Our planning is responsive to the needs of the children. We use a planning document to allow staff to think through the learning intentions, success criteria and the learning activities that will deliver these. See below.

Broomlands Primary School Numeracy and Mathematics - Number, Money and Measure

Context for Learning - Measurement [First:1]

Class:		Session:		Start date:	Finish date:
Statements of Experiences and Outcomes	Learning Intentions To know To understand To be able to	Learning Activities & Thinking Approaches Write, See, Make Do		Success Criteria	Suggested Resources
I can estimate how long or heavy an object is, or what amount it holds using everyday things as a guide, then measure or weigh it using appropriate instruments and units. MNU 1-11a	To understand that estimate means to make an informed guess using previous knowledge  To be able to use words such as, about, nearly, more than, less than help us to estimate			I can choose an appropriate non-standard unit to measure an object.  In practical work I can use correct comparative mathematical language, e.g. longer, shorter, lighter, heavier, more, less.  I can estimate and measure length, height, weight, mass and capacity using non-standard units.	WRM Year 1 Measurement: Length and Height.  WRM Year 1 Measurement: Weight and Volume

The twelve points plan (below) is principally to ensure consistency as we take forward together our improvement plan objective of improving the numeracy and mathematics across the school.

To further support planning in maths and numeracy, we use our 'Problem Solving' and 'Mental Agility' progressions. (See separate documents)

In addition to resources sourced and used by teaching staff as and when appropriate, we have a number of core resources available to staff to support teaching and learning. These include:

- White Rose Maths
- Teejay Mathematics
- Scottish Heinemann Maths
- Numicon Support Materials – Implementation & Teacher Guides
- Let's Think Through Maths
- Heinemann Interactive Mental Maths
- Prim-Ed Problem Solving in Mathematics

## **Our Twelve Point Plan for continued improvement in standards in numeracy and mathematics at Broomlands**

1. Implement five learning/teaching sessions each week, at least one hour each day.
2. Mental agility sessions should be additional to this hour, either as a discrete session, or woven into the lesson itself (refer to mental agility progression).
3. Each numeracy /maths session should begin with a 'Number Talks' activity, focussing on supporting children to think, strategize and articulate their understanding of number/maths processes. (See Number Talks books and consider use of the 'Reasoning & Problem Solving' questions in White Rose Maths).
4. Ensure maths and numeracy are recorded in separate locations e.g. separate jotters, front and back of a jotter, separate folders in Showbie, as appropriate.
5. Make careful, considered judgements about when children are able to confidently use the CONCRETE, PICTORIAL/REPRESENTATIVE, ABSTRACT approach to learning new concepts.
6. Expect all children to do their best to present written work neatly. Use the glossary of numerical & mathematical terms to ensure consistency if at all unsure.
7. Focus on problem solving strategies and progression in skills within context (refer to problem solving progression).
8. Present regular opportunities to apply numerical and mathematical skills across the curriculum and in real life situations.
9. Apply consistent formative and summative assessments to provide evidence of progress. Consider use of White Rose Maths 'End of Block Assessments', where relevant.
10. Homework in numeracy and maths should be used when appropriate to consolidate taught concepts in maths and numeracy.
11. Take part in regular professional discussions focused on assessment, evaluation and moderation to ensure consistency in standards.
12. Use Learning Walk opportunities to focus on numeracy methodologies.

## **A progressive Approach to Learning in Maths & Numeracy**

Research clearly evidence the importance of an approach to learning in maths and numeracy that follows developmental lines. This is broadly summarised by using approaches, materials and resources in line with the three stages outlined below:

### **CONCRETE**

*The enactive stage – the pupil is first introduced to an idea or a skill by acting it out with real objects. In division, for example, this might be done by separating apples into groups of red ones and green ones or by sharing 12 biscuits amongst 6 children. This is a 'hands on' component using real objects and it is the foundation for conceptual understanding. In the concrete stage, the teacher begins instruction by modelling each mathematical concept with concrete materials (e.g., red and yellow chips, cubes, base-ten blocks, pattern blocks, fraction bars, and geometric figures).*

### **PICTORIAL/REPRESENTATIVE**

*The iconic stage – the pupil has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem. In the case of a division exercise this could be the action of circling objects.*

*In this stage, the teacher transforms the concrete model into a representational (semi-concrete) level, which may involve drawing pictures; using circles, dots, and tallies; or using stamps to imprint pictures for counting.*

### **ABSTRACT**

*The symbolic stage - a pupil is now capable of representing problems by using mathematical notation, for example:  $12 \div 2 = 6$ .*

*At this stage, the teacher models the mathematics concept at a symbolic level, using only numbers, notation, and mathematical symbols to represent the number of circles or groups of circles. The teacher uses operation symbols (+, -, x, ÷) to indicate addition, subtraction, multiplication or division. This is the ultimate stage.*

Pupils should not move on to any abstract work in jotters and/or worksheets and text books until they are confident in their understanding. The above approach establishes the building blocks and toolkits for learning new concepts and if the first two are not firmly embedded the third will not succeed. It is likely that as children move up through the school, there will continue to be a blend of approaches supporting learning at any given time. The progress from concrete to abstract is not entirely linear, nor does it move at the same pace for all children.

Consideration will be given to a numeracy and mathematics learning wall in each classroom which will change in line with the current focus. Children will be encouraged to engage with this resource.

When considering homework in numeracy and mathematics it is important to vary the activity. Balance homework tasks by including those which are based on opportunities to explore:

- Research/Can you find out?
- Practical activities.
- Discussion with parents.
- Challenges.
- Consolidation activities.