

## **Killermont Primary School**

### **Numeracy and Mathematics Strategy**

**June 2018**

'To face the challenges of the 21<sup>st</sup> century, each young person needs to have confidence in using mathematical skills, and Scotland needs both specialist mathematicians and a highly numerate population'

#### **Building the Curriculum 1**

##### **Our vision for numeracy and mathematics**

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.

This strategy provides a clear framework for our school to raise attainment in Numeracy and Mathematics. We used a collaborative approach to the creation of this strategy by taking account of the views of pupils, teachers and the Senior Leadership Team. Through this strategy we strive to promote excellence and aim to ensure that every child achieves the highest standards in Numeracy and Mathematics sets out within Curriculum for Excellence levels, and the right range of skills, qualifications and achievements to allow them to succeed.

Within Killermont we promote a growth mindset and know that a crucial component of the learning cultures we create in the classroom is to continually talk with children about how the brain grows, and how we can grow our abilities in Numeracy and Mathematics through time, input, effort and practice. We also promote learning from one another, tapping into all our different strengths, encouraging teachers to use a wide range of pedagogical approaches to take pupils' learning forward in Numeracy and Mathematics.

## **What are the features of effective learning and teaching?**

A range of teaching strategies which take account of pupils' interests, previous experiences and attainment, will enhance pupils' learning. Learning and teaching approaches will be varied and responsive to the needs of children, taking account of different learning styles and contexts. When planning effective learning and teaching, our school will ensure that there will be a skilful mix of appropriate approaches, including:

- Relevant, real-life, enjoyable contexts that make frequent links across the curriculum that develop problem solving capabilities
- Promoting interest and enthusiasm for numeracy
- Building on prior learning with warm up activities
- Engaging and active learning
- Opportunities for pupils to explore mathematical concepts through play in a numeracy rich environment
- Effective use of a variety of learning resources
- Using technology in appropriate and effective ways
- Developing mental agility and frequently asking children to explain their thinking and opportunities for sharing and discussing strategies
- Building upon the principles of AiFL, including understanding the purpose and relevance of the activities
- Sharing Learning Intentions and co-constructing Success Criteria
- Collaborative working and independent thinking and learning
- Providing quality feedback to inform next steps
- Providing appropriate challenge and support in place to meet the needs of all learners

In addition to the above, numeracy and maths learning should develop metacognition, so that learners from the earliest stages are aware of what, how and why they are learning: this will support the development of Higher Order Thinking Skills and the ability to think critically.

## **Numeracy and Mathematics across learning**

While numeracy and mathematics may be regarded as discrete subjects, natural links to other curricular areas can be made. For example:

- Develop skills for learning, life and work.
- Science – Displaying data, formulae and equations. Weight, capacity and volume.
- P.E. - Time, distance and speed.
- Music – Tempo, rhythm, beat and pulse.
- Social studies – Timelines, mapping skills.
- Technologies - problem solving, coding, spreadsheets, mapping.

## Planning

Effective skills for learning, life and work are underpinned by strong numeracy skills. Each of the four contexts for learning: ethos and life of the school, curricular areas, inter-disciplinary learning and opportunities for personal achievement provide a range of opportunities for the development of numeracy skills.

The mathematics experiences and outcomes are structured within three main organisers, each of which contains a number of subdivisions.

<b>Number</b>	<b>Money &amp; Measure</b>	<b>Shape Position &amp; Movement</b>	<b>Information Handling</b>
Estimation and rounding Number and number processes Multiples, factors and primes Powers and roots Fractions, decimal fractions and percentages Patterns and relationships Expressions and equations.	Money Time Measurement Mathematics – its impact on the world, past, present and future	Properties of 2D shapes and 3D objects Angle, symmetry and transformation	Data and analysis Ideas of chance and uncertainty

During the initial planning stages, children's prior learning must be taken into account. Once this has been established, the outcomes and experiences can be explored suitable to the level the children are working within. SEAL planners break down individual skills to close gaps in pupils' learning.

The Benchmarks support teacher professional judgement of achievement of a level. They set out very clear statements about what children need to know and be able to do to achieve a level within numeracy and should be referred to regularly. In order to achieve a CFE level, it is not necessary for learners to demonstrate mastery of every individual aspect of learning in the Benchmarks. However, it is important that there are no major gaps in children's learning when looking across the organisers.

Numeracy and mathematical skills are embedded in the Experiences and Outcomes and cannot be taught in isolation. These skills can be developed through:

- Careful planning of learning opportunities
- Effective Questioning
- On-going assessment which informs planning and teaching

As learners progress through Curriculum for Excellence levels, they should demonstrate increasing sophistication and independence in their ability to demonstrate, link, transfer and apply the following skills in a range of increasingly more challenging contexts:

- Interpret questions;
- Select and communicate processes and solutions;
- Justify choice of strategy used;
- Link mathematical concepts;
- Use mathematical vocabulary and notation;
- Use mental agility;
- Reason algebraically;
- Determine the reasonableness of a solution

"Students need to be actively involved in their learning and they need to be engaged in a broad form of mathematics, using and applying methods and communicating ideas". (Boaler, 2010).

It is important to remember to revisit taught concepts regularly to thoroughly embed strategies and skills. Learners also need to have opportunities to apply taught skills and strategies to problem-solving contexts.

### **Assessment, Achievement and Attainment**

"One critical principal of good testing is that it should assess what is important." (Boaler, 2016 pg. 141)

Evidence of progress and achievement will come from:

- Observing day-to-day learning within, and out with, the classroom providing feedback, opportunities for dialogue and mid learning stops
- Classwork
- Learning conversations
- Planned periodic holistic assessments
- Information from standardised assessments

(Refer to KPS Assessment Strategy for more details)

Learners should be encouraged to talk about maths, to ask questions, display thinking and select methods in order to solve problems.

Assessment judgements should be made using the Benchmarks. The Benchmarks describe the standards that children and young people need to meet to achieve a level. The Benchmarks are grouped together to support holistic assessment and avoid assessment of individual Experiences and Outcomes.

Assessment is an on-going process to support learning. The Benchmarks should be used to help monitor progress towards achievement of a level and to support overall professional judgement of when a learner has achieved a curriculum level. They support professional dialogue, moderation and monitoring of progress in learning.

Achievement of a level is based on teacher professional judgement, well informed by a wide range of evidence. Benchmarks should be used to review the range of evidence gathered to determine if the expected standard has been achieved and the learner has:

- Achieved a **breadth** of learning across the knowledge, understanding and skills as set out in the Experiences and Outcomes for the level;
- Responded consistently well to the level of **challenge** set out in the Experiences and Outcomes for the level and has moved forward to learning at the next level in some aspects; and
- Demonstrated **application** of what they have learned in new and unfamiliar situations

### Resources

Resources are supportive tools to help children develop and deepen their understanding of the concept being taught. Using a variety of materials engages pupils with varying learning needs and accommodates a range of learning styles. Pupils should have access to materials that they find helpful to reduce barriers and enhance children’s learning experience.

<b>Paper Resources</b>	<b>Practical Resources</b>	<b>External Links</b>
SHM Textbooks HAM Textbooks Maths in Action Workbooks Photocopiable resources	Ham Gameboards Board games Money Digi-flips i-Pads concrete material e.g. Numicon, Unifix cubes base ten materials 3d shapes Table squares / hundred squares Outdoor learning “Show me” boards	Parents as partners Outside agencies e.g. banks Scottish Mathematical Challenge Sumdog Real life context e.g. trips to supermarket Enterprise

## Differentiation and Support for Pupils

Differentiation and support for all pupils is one of the key elements to raising attainment in numeracy and mathematics. Research suggests the most effective teachers consistently use a range of differentiated strategies including, flexible grouping; ongoing assessment and a variety of daily numeracy activities. (Cox 2008)

Differentiated learning can be achieved by adapting the following aspects of learning.

**Content:** resources; questioning; tasks

**Process:** varying time provided; input and support; pupils as leaders of learning ; collaborative learning

**Product:** allowing pupil choice; different expectations for groups

**Learning Environment:** incorporating outdoor learning; displays; quiet areas; seating plans

**Strategies that could be used:**

**Mixed ability groupings:** It has been proven that children of lower ability improve in their numeracy skills and knowledge when working alongside peers of higher ability. Equally, more able pupils also benefit by explaining and justifying their strategies and knowledge.

**Flexible groupings:** Children learn different aspects of numeracy and mathematics at varying rates and therefore children's ability to succeed can depend on the subject/context being taught. If groupings are fixed misconceptions of children's knowledge and skills may be formed. Flexible groupings help to prevent the establishment of children having fixed mindsets and believing that they can only achieve at a specified level.

**Varying daily numeracy activities:** Children's learning experiences should include a range of activities. Worksheets; textbooks; games; online activities; collaborative learning; use of ICT; outdoor learning experiences; learning through play; applying maths in real-life contexts including skills to develop the young workforce.

Visual representations must be used to embed skills (concrete, visual and abstract).

Differentiated learning used effectively, produces learners with an improved sense of self-belief, engagement and passion for learning (Hillier, 2011)

## **Monitoring and Tracking**

To ensure successful numeracy and mathematical development for all learners we have an annual monitoring and tracking calendar for each stage in the school. Teachers plan assessments directly linked to recent learning with mathematics and numeracy. These assessments should cover at least two curriculum organisers and be differentiated where appropriate to meet the needs of the learners. Effective assessments include calculations and word problems which assess concepts taught and provide opportunities for learners to demonstrate application of knowledge and skills. Sumdog can also be used by teachers to create assessments. Mental Maths agility is also assessed where learners are encouraged to show their working.

SEAL assessments are used effectively to track children's progress.

Assessment information is recorded on tracking grids and staff use a code to highlight strong performance or concerns where further actions are required. A meeting between class teacher and SLT is held to discuss the results, identifying next steps planned and individual/groups requiring further support/challenge identified.

Ultimately effective assessment needs to have a clear purpose – it needs to inform teachers impact and next steps to ensure children make progress.

## **Family and Home Learning Approaches**

We value parental partnership and recognise that family and home learning has a positive impact on pupil progress. We have reviewed our home learning approaches in consultation with parents and pupils and modified it in light of the feedback received. Examples of home learning include:

- Consolidation of concepts taught in school
- Real life practical examples e.g. pocket money, telling time, budgets, height charts, baking
- Strong partnerships between all stakeholders in promoting numeracy and mathematics through workshops, parents' meetings etc.
- Developing SEAL packs for homework