

# Numeracy across the Curriculum Policy



## **Rationale:**

Numeracy contributes to and draws from many subjects and aspects of the curriculum. Pupils can be helped to appreciate the importance of numeracy in their lives by making these links explicit. For example, if it is known how numeracy is applied in other subjects and colleagues are asked to exemplify applications for use in mathematics lessons, it will be possible to provide examples and contexts which pupils know and understand. As such, numeracy becomes an essential-skill in the curriculum and also a life skill.

Hawthorn High School is committed to developing the full range of numeracy skills for all pupils through a co-ordinated approach involving all staff across every curriculum area. The School aims to empower pupils with the numeracy skills required for them to become confident learners and lead fulfilled lives as citizens of their local and the wider community.

## **Aims:**

- to enhance standards in mathematics across the curriculum;
- to ensure that numeracy is listed as a teaching theme;
- to identify in schemes of work, topics which involve the use of numerical skills;
- to enhance standards in aspects of subjects where mathematics is a major contributor;
- to enable students to transfer mathematics skills across subject areas;
- to ensure an agreed consistency of approach and progression in the teaching, use and application of numerical concepts and mathematics across the curriculum.
- to increase awareness amongst teachers of the contribution that mathematics can make to each curriculum area and vice versa;
- to help pupils appreciate the importance of mathematics in their lives;
- to enable pupils to understand and apply mathematics in the context of other subjects that they study.
- to monitor the consistency of delivery of numeracy within the classroom:

## **Numeracy Coordinator**

It is the Numeracy Coordinator's responsibility to:

- Develop and manage whole school Numeracy across the curriculum.
- Establish a development plan for numeracy, to include aspects of intervention programmes and cross-curricular developments.
- Monitor and evaluate the effectiveness of numeracy across the school at the designated key stage.
- Work with support staff to establish numeracy support needs and plan for implementation.
- Research current sector leading practice in whole school numeracy development.
- Audit the implementation of the Numeracy Policy throughout the school.
- Model effective numeracy teaching.
- Plan and run testing regimes to identify pupils who need support with numeracy
- Liaise with subject leaders in planning the inclusion of literacy objectives in schemes of work
- Disseminate relevant numeracy data throughout the school
- Assist subject staff when required in the development of resources and teaching and learning strategies to raise standards of numeracy.
- Plan, arrange and lead staff meetings on Numeracy as agreed with the leadership team.
- Effectively communicate relevant information to parents and leaders of learning.
- Ensure the high profile of numeracy skills throughout the school.

## **Subject Leaders**

It is the responsibility of subject leaders to:

- Model good numeracy teaching in their subject area
- Research current good practice in Numeracy relevant to their subject
- Audit Numeracy practice within their department and use CPD and Performance Management to enhance staff skills
- Utilise relevant assessment data in setting departmental targets
- Ensure that each scheme of work has clear and appropriate numeracy objectives and promote sharing of good practice through departmental meeting time
- Monitor the ways in which staff use these objectives to plan and deliver lessons
- Review through lesson observations, work scrutiny exercises and departmental self-evaluation the impact of numeracy teaching on the progress of learners.

## **Individual Teachers**

It is the responsibility of all classroom teachers to:

- Model good numeracy skills in their subject area.
- Utilise all relevant assessment data in devising appropriately challenging targets for pupils in their classes so that departmental targets may be achieved.
- Deploy shared strategies for delivery of the "skill of the month" initiative.
- Build into lesson planning the agreed numeracy strategies of the subject area.
- Strive to meet numeracy related objectives in the performance management process and/or identify opportunities for CPD.
- Mark pupils work according to school and departmental assessment policies and set pupils challenging numeracy goals within their subject area.
- Monitor and reward identified progress in numeracy.
- Support those pupils with additional numeracy needs using a variety of differentiated approaches.

## **Numeracy Support**

Those pupils who may require support with numeracy development are offered a range of high quality intervention strategies. Using the National Numeracy testing results pupils with standardised scores below 100 are then assessed on the BKSB package to identify their gaps and determine the level of intervention:

- **Red:** pupils who achieve less than 85 on the standardised score are offered an hour a week of small group numeracy enhancement support by the BKSB numeracy package at the appropriate level based on the diagnostic test outcome. Any SEN/V class pupils have an adjusted scheme of work through their Maths lessons.
- **Amber:** pupils, those who score between 85 and 94 on the standardised score, use the BKSB literacy recovery package to address skill deficiencies. The results of a diagnostic test determine the precise nature of their activities. They are also offered an hour a week of small group support.
- **Amber:** The higher scoring Year 7 pupils in Amber are supported by Year 12 Numeracy Buddies for two 20 minute sessions a week in form time. They followed the 'Number Workout' folder provided by the Basic Skills Agency.
- **Green** pupils, those who score between 97 and 105 are supported by teaching staff in the Maths department through their differentiated Maths sets.

All pupils on a numeracy intervention are tracked and monitored on a half-termly basis using BKSB.

All Year 8 pupils have numeracy themes delivered in form time on a weekly basis by form tutors. The form tutors are either Maths teachers or teachers from a heavy numerate subject area.

## **Parents as Partners**

At Hawthorn we strongly believe that the best possible learning environment for pupils can only be achieved through clear links between school and home. Parents are invited to support and encourage Numeracy development through monitoring of pupils' accuracy of basic skill calculations and presentation of data. Specially designed Parents' Evenings offer advice and suggestions for further home activities should parents wish to take a more active role in promoting their child's numeracy skills at home.

## Subjects of the curriculum:

Learners develop their number skills across the curriculum by using **mathematical information, calculating, and interpreting and presenting findings.**

In **art and design**, learners apply number skills such as measurement, estimates, scale, proportion, pattern and shapes to develop, inform and resource their creative activities.

<b>Art</b>		
Ordering and Following Sequences	Classification/Analysis of Data	Scale
Symmetry	Tessellations	Two Dimensional Drawing
Three Dimensional Drawing	Golden Ratio	

In **design and technology**, learners ask questions and seek out information to develop and support their design ideas. They communicate and record their ideas and intentions by explaining, writing, sketching, using detailed technical drawings and three-dimensional models.

<b>Technology</b>		
Measurement	Conversion Between Units	Use of Millimetres
Construction of Polygons	Three Dimensional Drawing	Mental Calculations
Estimation	Time	Volume & Mass
Graphs	Drafting	Three Dimensional Modelling
Casting	Time Planning	Scaling
Use of Square/Isometric Paper	Weighing	Measuring
Taking/Reading/Recording Results	Sampling	Comparative Studies
Flow Charts	Proportion	Ratio

In **english**, learners develop skills in the application of number through activities which include number rhymes, ordering events in time, gathering information in a variety of ways, including questionnaires; accessing, selecting, recording and presenting data in a variety of formats.

In **geography**, learners apply number skills in the classroom and in field work to measure, gather and analyse data. They use mathematical information to understand direction, distances and scale and to determine locations when using plans, maps and globes.

In **history**, learners develop their number skills through developing chronological awareness, using conventions relating to time, and making use of data, e.g. *census returns and statistics*.

<b>Humanities</b>		
Use of Grid References	Units: cm, mm, inches	Labelling Axes
Measurements	Conversion Graphs	Three Dimensional Representation
Scale	Charts (Pie; Histograms; Scatter)	Compass Points
Tally Charts	Percentages	Timelines
Latitude	Longitude	Chronology

In **ICT**, learners use mathematical information and data presented numerically and graphically in data-handling software. They use number to collect and enter data for interpretation in spreadsheets and simulations and present their findings as graphs and charts, checking accuracy before processing.

In **mathematics**, learners use their number skills throughout the programme of study when solving problems in a variety of practical and relevant contexts and when investigating within mathematics itself.

<b>Business Studies</b>		
Estimation from Spreadsheets	The word "Sum"	Labelling Axes
Paper Size & Dimensions	Production of Tables	Percentage Increase
Ratio	Drawing Conclusions from Tables	Awareness of Sensible Answers
Costings	Sampling in Market Research	Deductive Reasoning

In **modern foreign languages**, learners develop number skills through a range of activities in the target language. These can include number rhymes; ordering numbers; ordering events in time; using number in relevant contexts such as currency exchange; gathering information in a variety of ways, including questionnaires and recording and presenting results in a variety of formats.

<b>Modern Foreign Languages</b>		
Surveys	Money & Shopping	Foreign Numbers
Alphabet (Codes)	Temperature	Digital/Analogue
		Time
Weights & Measures	Bills	Menus
Fractions	Time	Directions

In **science**, learners work quantitatively to estimate and measure using non-standard and then standard measures, recording the latter with appropriate S.I. units. They use tables, charts and graphs to record and present information. With increasing maturity they draw lines of best fit on line graphs, use quantitative definitions and perform scientific calculations.

<b>Science</b>		
Substitution into Formulae	Rearranging Formulae	Estimation
Averages	Tally Charts	Units
Memory Facility on Calculators	Cubic Centimetres $\text{cm}^3$	Metric Units
Indices	Negative Numbers on Scales	Proportion & Ratio
Inverse Proportion	Graphs - Use of Axes	Rounding - Accuracy and Error
Problem Solving	Percentages	Drawing Graphs by Rules
Extrapolation of Graphs	Interpretation of Graphs	Nomenclature of Numeracy
Recognition of Patterns	Hypothesising	

In **welsh**, learners develop their number skills through activities which include number rhymes, using ordinal and cardinal numbers, placing events in chronological order, using measures, gathering information in a variety of ways, including questionnaires: accessing, selecting, recording and presenting data in a variety of formats.

**Physical Education/Expressive Arts**

Ordering/Sequencing	Grouping/Patterns	Space/Time/Distance
Prediction & Estimation	Comparison of results	Data Collection
Measuring/Calculations	Scoring	Survey
Averages	Spatial Awareness	Angles, Planes & Axes
Rotation & momentum	Acceleration & Deceleration	Recording Results
Classification	Timing & Timekeeping	Sequencing

Every subject makes a contribution to mathematics across the curriculum because they all use some aspects of mathematics. However, certain subjects use mathematics, on a day-to-day basis, more than others. These subjects are design and technology, geography, information technology and science. We will refer to them as 'major users', the other subjects being known as 'minor users'.

For the major users, the following table identifies the most important aspects of mathematics encountered.

<ul style="list-style-type: none"> <li>• <b><i>Averages, measures of spread,</i></b></li> <li>• Area and volume</li> <li>• Calculation techniques</li> <li>• Co-ordinates</li> <li>• <b><i>Estimation.</i></b></li> <li>• <b><i>Formulae:</i></b> <ul style="list-style-type: none"> <li>✓ <b><i>triangle representation;</i></b></li> <li>✓ <b><i>use of words and symbols</i></b></li> </ul> </li> <li>• <b><i>Graphs:</i></b> <ul style="list-style-type: none"> <li>✓ <b><i>bar graphs;</i></b></li> <li>✓ <b><i>pie charts;</i></b></li> <li>✓ <b><i>pictograms;</i></b></li> <li>✓ <b><i>scatter graphs;</i></b></li> <li>✓ <b><i>histograms;</i></b></li> <li>✓ <b><i>line graphs;</i></b></li> <li>✓ <b><i>algebraic graphs.</i></b></li> </ul> </li> <li>• <b><i>Measuring:</i></b> <ul style="list-style-type: none"> <li>✓ <b><i>units;</i></b></li> <li>✓ <b><i>prefixes (e.g. pico, nano, etc)</i></b></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Negative numbers</li> <li>• <b><i>Proportions:</i></b> <ul style="list-style-type: none"> <li>✓ <b><i>fractions;</i></b></li> <li>✓ <b><i>percentages;</i></b></li> <li>✓ <b><i>decimals;</i></b></li> <li>✓ <b><i>ratio and scales.</i></b></li> </ul> </li> <li>• Shape and space:           <ul style="list-style-type: none"> <li>✓ nets;</li> <li>✓ symmetry;</li> <li>✓ tessellation;</li> <li>✓ transformations.</li> </ul> </li> <li>• <b><i>Surveys and data capture.</i></b></li> <li>• <b><i>Tables of data:</i></b> <ul style="list-style-type: none"> <li>✓ <b><i>constructing;</i></b></li> <li>✓ <b><i>reading;</i></b></li> <li>✓ <b><i>interpretation.</i></b></li> </ul> </li> <li>• Trial and improvement</li> </ul>
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Aspects common to ALL major users are indicated in bold italics.

The aspects in the above table will have specific terminology, vocabulary and conventions attached to them. These have been agreed by the major users and the mathematics department:

- use of units;
- mathematical notation and terminology to be used;
- algebraic and other mathematical techniques. For example, how to simplify algebraic expressions or solve equations;
- how graphs are to be presented and used;
- how and when ICT resources, such as graph plotters or graphical calculators, will be used to support mathematics.

For further details, please consult the glossary.

### **Role of departments:**

All departments will ensure that the aspects of mathematics identified in the audit are clearly signposted in their schemes of work. In addition, the role of the mathematics department is important:

- in using subject-specific examples for teaching and learning activities;
- in liaison with other departments;
- in training other staff in the use of flexible methods of calculation;
- by agreeing terminology and conventions;
- giving information as to when numeracy aspects are covered in mathematics.

Good liaison should help to ensure that all staff use common approaches that mirror those used in mathematics lessons. Approaches to calculations should be the same in all subjects. All teachers will need to know about:

- the use of mental and informal written methods, especially with lower attaining pupils;
- the expectation that pupils should add and subtract pairs of two-digit numbers mentally;
- how and when calculators should be used.

## **Monitoring:**

The effectiveness of this policy, as a working document, must be evaluated over time. Suitable success criteria might be:

1. More teachers are aware of developments in mathematics and numeracy through the LNF in primary schools and at KS3.
2. Awareness levels of teachers are raised about the use of mathematics in their own subject(s).
3. Confidence levels of teachers raised to deal with mathematics in their own subject(s).
4. More teachers plan effectively for mathematics in their own subject(s).
5. Increased liaison between mathematics department and other departments about strategies for teaching mathematics, times when mathematical topics are taught and subject-specific examples for use in mathematics lessons.
6. A higher proportion of pupils like mathematics.
7. Confidence levels of pupils raised when using mathematics in mathematics lessons and in other subjects.
8. A higher proportion of pupils are aware of the mathematics used in other subjects.
9. A higher proportion of pupils are aware of the usefulness of mathematics in other subjects.