



Haslingden High School and Sixth Form

Numeracy Policy January 2016

Rationale

Numeracy is important for the following reasons:

- Numeracy skills enable students to understand and interpret numerical and graphical information. This facilitates improvement in students' abilities to make their own judgements and to draw sensible conclusions from information.
- Almost all subjects depend on students having competence in basic numeracy skills.
- If students numeracy skills are not developed and used they may well be denied the opportunity to develop the level of understanding of some topics or subjects at the level expected for their age.
- People who struggle to use numbers may feel embarrassed by their difficulties, and this can affect their confidence and self-esteem. They may fail to manage their money well or to get the best deals when shopping.
- Employment: people with poor numeracy skills are more than twice as likely to be unemployed as those competent in numeracy
- Crime: A quarter of young people in custody have a numeracy level below that expected of a seven-year-old, and 65% of adult prisoners have numeracy skills at or below the level expected of an 11-year-old

What is Numeracy?

The international description of mathematical literacy:

- "Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen". (PISA)

Students with well-developed numeracy skills will:

- Have a sense of the size of number.
- Know by heart basic number facts such as number bonds, times-tables, doubles and halves, and recall them rapidly.
- Use what they know by heart to figure out an answer mentally.

- Calculate accurately, both mentally and with pencil and paper, and be able to draw on a range of strategies.
- Use a calculator judiciously.
- Make sense of number problems and recognise the operations needed to solve them.
- Know for themselves that their answers are reasonable and have strategies for checking.
- Explain their methods and reasoning, using correct terminology.
- Suggest suitable units for measurement and make sensible estimates of measurements.
- Explain and make sensible predictions from numerical data in a graph, chart or table

At a classroom level, better numeracy standards are associated with:

- Well-structured lessons and good use of time, so that pace is maintained and the minimum of time is spent on class administration or control.
- Sessions of direct teaching, with teachers involved proactively, not just when students are stuck.
- Regular interaction with students, with the teacher using perceptive questioning, giving careful attention to misconceptions and providing constructive help.
- Rehearsal of existing knowledge and skills, including emphasis on instant recall of as many number facts as possible.
- Recognition that *knowing by heart* and *figuring out* support each other in developing numeracy.
- Careful attention to the development of mathematical vocabulary and the use of correct terminology and notation.
- Teaching a range of computation methods and ways of recording them – including mental, written and calculator methods, asking students to explain their methods and discussing with them which methods are best suited for particular purposes.
- Planning a variety of activities on a topic, both to consolidate and extend mathematical skills.
- Identifying opportunities in other subjects to reinforce and extend mathematical skills.
- Systematic assessment of the progress of a class to monitor students' strengths and weaknesses and to plan the next stage of work.
- Clear procedures for the early identification of students with difficulties, combined with targeted and positive support to help them to keep up with their peers.

Numeracy across the curriculum

- Numeracy is not the sole responsibility of the mathematics Faculty. Most other subjects can contribute to the development and enhancement of students' numeracy skills including their ability to describe and explain their strategies and reasoning.
- Here are some examples of the numeracy skills used in subjects other than mathematics.

<p>English Frequency of words: (eg Shakespeare versus Bacon?) Bar charts, pie charts. Surveys Terminology for descriptive writing. Line graphs Mathematical vocabulary</p>	<p>Science Various arithmetical calculations on decimals and fractions including ratio, use of formulae, percentages. Graphs and charts of all kinds. Shape in 2D and 3D. Golden ratio/ Fibonacci sequence (biology & human biology). Use of units.</p>	<p>Art Islamic art and design; shape in 2D and 3D; simple ratios; perspective; Golden ratio. Escher tessellations. The art of Wassily Kandinsky, Piet Mondrian, Theo Doesburg and others use geometrical shapes.</p>	<p>DT Various arithmetical calculations on decimals and fractions including ratio, use of formulae, percentages. Graphs and charts of all kinds. Construction and measure of 2D and 3D shapes. Development costings.</p>
<p>Geography Graphs and charts of various kinds. Fractions and percentages, ratios. Population growth. Four-figure (or more) grid references. Study of maps, angles and position.</p>	<p>History Graphs and charts of various kinds. Percentages, ideas of large numbers, wealth. Measures of weight, length and time.</p>	<p>ICT Spreadsheets, databases, algebra, flowcharts. Collect and classify data. Measurement of distance and angle in control systems. Production of graphs and charts.</p>	<p>Modern Foreign Languages Measures of length/ Distance, time and weight, (angle?) counting, tables, exchange rates. Money/costs, speeds, distance.</p>
<p>Music Pythagorean intervals. Fractions, square roots; doubling of frequencies (powers of 2); aleatory music (using dice to compose); Golden section eg used by composers Eric Satie, Bartok, Debussy, Schubert</p>	<p>PE Speed, distance, time, units, weight, graphs and charts, percentages, power/weight ratios. Calculations of energy expended. Symmetry Movement and direction</p>	<p>RE Shape eg. Pentagon – five pillars of Islam Octagon –eightfold path. Calendar years and years of other faiths.</p>	<p>PSHE Developing Financial capability through mathematics. Eg. Looking after and saving money, spending and saving (bank accounts, loans, credit cards etc.), calculating the cost of a holiday, credit ratings.</p>

Methods of Calculation

- It is important that data should not be presented without discussion. Some interpretation of data should always take place.
- The Mathematics Faculty will have overall responsibility for teaching methods of calculation in the 4 rules (+, -, ×, ÷), decimals, fractions, percentages, efficient use of calculator, approximations, and use of protractor.
- Although a variety of methods can be used, these will be restricted to just one or two to avoid confusion.
- Correct methods learnt at primary school will be acceptable and developed if necessary.
- Teaching methods of calculation will not be the sole responsibility of the Mathematics Faculty and all subjects should play a part.

Students in all lessons should:

- Make correct use of mathematical vocabulary when providing oral and written answers or asking questions.
- Present ideas and information they have collected in the form of displays of charts and tables.
- Interpret, describe and explain their work and not simply reproduce graphs, tables and charts or statements concerning percentages and other numerical data.
- Set their work out systematically and with care. Where there are calculations these should always be set out so the method used is clear. Where there are graphs these should always show a suitable scale, be correctly labeled and have a title.

Teachers of all subjects should:

- Have regard for the whole school numeracy policy in their planning of lessons.
- Use and explain mathematical vocabulary whenever it will enhance students' knowledge, skills and understanding of the topic. The use of such vocabulary by students should be strongly encouraged.
- Give emphasis to mental calculation when it is sensible to do so.
- Encourage students to estimate when appropriate.
- Use and explain appropriate calculations and data whenever it will enhance students' knowledge and understanding of the topic. The explanation should be in line with whole school policy.

- Choose and use appropriate units of measure correctly.
- Demonstrate how to select a type of graph appropriate to the data provided.
- Correctly label a graph or chart.
- Correctly interpret a graph or chart and make appropriate comparisons where more than one graph illustrates the data.
- Explain the steps in the solution to a problem.
- Discuss and clarify why a particular method of calculation works.
- Use and explain the meaning of appropriate mathematical terms.
- Recognise situations and problems in which numeracy skills and understanding can be used
- Assess the numeracy skills required to address these situations or problems – selecting the right tools and knowledge is a core part of being functionally numerate

Departmental schemes of work should:

- Identify topics/areas requiring numeracy skills.
- Provide guidance to staff concerning approaches to the use of numeracy skills in their subject.
- Ensure that units of measure are written according to the correct convention.

All members of staff have access to the online Numeracy Booklet in Google Drive. This contains examples of how the Mathematics Faculty teaches various numeracy topics. In order to ensure consistency these method should be referred to when teaching some element of numeracy.

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