



Carshalton High School for Girls

Numeracy Policy

Reviewed January 2015

“A numerate student is one who has the ability to cope confidently with the mathematical needs of adult life. There should be an emphasis on the wider aspects of numeracy and not purely the skills of computation” **The Cockcroft Report (1982)**

Rationale

It is important that all learners develop the ability to apply numerical understanding and skills to solve problems in a variety of curriculum contexts and to cope with practical mathematical demands of everyday life, further or higher education and employment.

The focus on numeracy skills is not just the responsibility of the Mathematics department. All subjects where learners are expected to apply numerical skills will take positive steps to develop students' numeracy concepts and provide contextualised opportunities to utilise mathematical language, processes and written expression.

Numeracy

Numeracy is a proficiency which involves confidence and competence with numbers and measures.

It is more than an ability to do basic arithmetic. It requires understanding of the number system, a repertoire of mathematical techniques and an inclination and ability to solve quantitative or spatial problems in a range of contexts. Numeracy also demands understanding of the ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables.

The staff of Carshalton High School for Girls is committed to developing numeracy skills in all our students, in the belief that it will support their learning and raise standards across the curriculum so that learners:

- have a sense of the size of a number and where it fits into the number system
- recall mathematical facts confidently
- calculate accurately and efficiently, both mentally and with pencil and paper, drawing on a range of calculation strategies
- use proportional reasoning to simplify and solve problems
- use calculators and other ICT resources appropriately and effectively to solve mathematical problems, and select from the display the number of figures appropriate to the context of a calculation
- use simple formulae and substitute numbers in them
- measure and estimate measurements, choosing suitable units, and reading numbers correctly from a range of meters, dials and scales
- calculate simple perimeters, areas and volumes, recognising the degree of accuracy that can be achieved
- sequence dates – both BC and CE [AD] – and in different calendars – so that synchronic and diachronic principles are understood and can be applied
- understand and be able to use numbers in rhythm, timetables, patterns and plans
- understand and use measures of time and speed, and rates such as £/€ per hour or miles/kilometres per litre
- draw plane figures to given specifications and appreciate the concept of scale in geometrical drawings and maps
- understand the difference between the mean, median and mode and the purpose for which each is used
- collect data, discrete and continuous, and draw, interpret and predict from graphs, diagrams, charts and tables
- have some understanding of the measurement of probability and risk
- explain methods and justify reasoning and conclusions, using correct mathematical terms
- judge the reasonableness of solutions and check them when necessary
- give results to a degree of accuracy appropriate to the context

Implementation

Successful implementation of this policy is dependent upon the extent to which we:

- take account of the needs of all students
- structure lessons appropriately in ways that support and stimulate numeracy skills development
- recognise how resources will be organised and used to support this teaching
- monitor and evaluate the impact of shared expectations of students' developing ability in the use of mathematical language and skills

Resources

We aim to provide:

- displays of numeracy materials and aides relevant to the topic or subject and highlight key vocabulary and mathematical terms
- relevant material at appropriate levels of difficulty
- access to calculators and ICT sources of information
- a classroom environment which is conducive to good numeracy practice

Assessing Numeracy across the Curriculum

When assessing students' work across the curriculum we value their oral contributions, in explanations and discussions, where numerical and reasoning skills are evident.

We take into account students' performance in numeracy when assessing and reporting on students' progress in subject areas.

When setting tasks we make explicit to the students the key features of numeracy which will be considered.

When responding to students' work we will:

- make comments which are positive and supportive
- target specific areas for improvement (a selective and focussed identification of errors)
- give guidance on how to improve accuracy of measurement, calculation or diagramming
- create opportunities for students to reflect on the quality of their own work and for peer assessment

Numeracy 5 a day

Numeracy should not be isolated to Mathematics. Numeracy appears in all subjects and therefore there is a need to help students develop their understanding of how number, data, ratio, proportion, percentages and calculations are used in other subjects as well as standardise our approach when tackling mathematical responses.

In order to do so, teachers must highlight which particular area of mathematics they are undertaking during their lessons. They can do so by choosing the appropriate 'fruit' from Numeracy 5 a day. This will help to forge a link for students between that subject and the mathematics they are undertaking in Mathematics lessons.

Numeracy mats are given to all teachers with an agreed, standardised approach on how to approach mathematical theory. Teachers must distribute these in lessons to assist with mathematical theory in their subject. Mats are available for the 5 key areas including Ratio, Proportion and Percentages, Calculations, Number and Data

Roles and Responsibilities

Senior Leadership Team: Deputy Headteacher responsible for Numeracy leads and gives a high profile to numeracy

Curriculum Leader Mathematics and teacher in Mathematics responsible for Numeracy: liaises with numeracy champions and/or Curriculum Leaders and Student Support. Provides whole school and curriculum training

Mathematics teachers: provide students with knowledge, skills and understanding they need to count, measure, calculate, chart or graph

CPD Co-ordinator: takes responsibility for ensuring teachers' own numerical confidence and for promoting pedagogical strategies that teachers can use to promote numeracy in the classroom

Teachers across the curriculum: contribute to students' development of numeracy by contextualisation, and problem solving using appropriate mathematical techniques

Head of Student Support: identifies and assesses students with numeracy difficulties. Liaises with Curriculum Leader Mathematics. Provides INSET and training. Monitors student progress and works with staff to determine future provision. Plans intervention programmes for students with severe numeracy difficulties

Teacher in Mathematics responsible for Numeracy: develops strategies, provides whole school training. Supports faculties in the implementation of strategies and encourages them to learn from each other's practice by sharing ideas

Parents: encourage their children to use the range of strategies they have learnt to improve their levels of numeracy

Students: take increasing responsibility for recognising their own numeracy needs and making improvements

Governors: Staffing, Students & Curriculum committee is responsible for numeracy. The Link Governor for Mathematics will liaise with the Director of Maths responsible for Numeracy regularly

How Numeracy is incorporated across individual departments

Art and Design

- Students use numeracy in many areas in Art and Design
- Many patterns and constructions are based on numerical ideas and properties of shapes, including symmetry
- Designs may need to be enlarged or reduced introducing ideas of ratio and scale factor
- In areas of sculpture proportion and measurement are used
- When mixing paints and colours, students use ratio and proportion to produce different shades and colours from the three primary colours
- Use standard measures to find length
- Form repeating patterns, making use of reflection, rotation and translation
- Calculating the golden ratio in pictures/drawings (Mona Lisa)

Business Studies

- Numeracy is an essential element of all Business Studies courses
- Students use numeracy in both the creation and interpretation of graphs, charts and tables
- Percentages are widely used in data comparisons
- Students need to be able to estimate using mental calculations but they also need to be confident in the use of a calculator
- Skills of analysis are involved when looking at primary and secondary data and in the scrutiny of questionnaire results. Students also use Excel spread sheets
- By applying numeracy skills to problems set in financial and other real life contexts, students will develop their financial capability and awareness of the applications of real life numeracy

Drama

- Sequencing events in a novel or play
- Develop the use of 'artistic' symmetry within a piece of theatre
- Exploration of scale in designing and making sets
- Use of scale/sizing of e.g. fonts in publicity material
- Creation of rehearsal schedules

English

- Numeracy is not actively used in English, but will come up in activities associated with texts e.g. contextual work on wages in past times
- Timelines are used to set a piece of work within its historical background
- Graphs can be used to show changes in the emotions of characters
- Patterns of rhythm and rhyme in poetry
- Comparison of two data sets on word and sentence length
- Reading and writing numbers, identifying centuries
- Coding, secret codes
- Grouping/categorising ideas/words

Geography

- Numeracy is used in many aspects of learning in Geography
- Scale, direction, ratio and distance are used in map reading
- Graphs and charts are used in the interpretation of patterns and trends
- Students generate, analyse and present data through fieldwork investigations

Government and Politics

- Students use graphs, charts and statistics to make generalisations about voting behaviour in the UK and the US
- Students are often required to study opinion polls and be able to apply the statistics to back up points made in their essays

Health and Social Care

- Students use graphs, charts and measurement skills when learning about nutrition and read data when comparing actual and expected growth rates in young children, for example

History

- Numeracy is used in the interpretation and construction of timelines and chronology and when analysing numerical sources, for example, the military strength of countries at the start of World War One.
- Students interpret statistics, draw inferences from them and assess their reliability.
- Graphs and tables are used in the presentation of evidence. Being able to sequence and to sequence events accurately are both crucial numerical skills.

Information and Communication Technology (ICT)

- Students will apply numeracy in a variety of ways in ICT lessons. These include collecting and classifying data and entering it into software, producing graphs and tables, interpreting and explaining their results
- When students use computer models they will use their ability to interpret numbers and identify patterns and relationships
- When designing PowerPoint presentations or websites, students will use proportion and their knowledge of shape and space as well as an understanding of enlargement when changing the size of an object
- Other numerical skills are used when using formula and formatting within Excel spread sheets

Media and Film Studies

- Involves basic numeracy
- Working out timings when shooting and editing film
- Use of basic statistics when researching media institutions and audiences (audience figures/circulations/budgets and gross profits for films/TV programmes etc)
- Use of graphs and tables to illustrate results of audience research

Modern Foreign Languages (MFL)

- Students use numeracy in MFL when learning to tell the time in Year 7
- Calculating café bills in Year 8
- Handling money, working on days and dates
- Doing simple arithmetic calculations involving addition, subtraction and multiplication.
- Work in MFL offers some students the additional opportunity they need to grasp the fundamentals of number work.

Music:

- The counting of time, beats, half beats and rests are used extensively in Music, as are rhythms and rhythm patterns.

Physical Education

- Athletic activities require measurement of height, distance, time, speed and symmetry
- Movement and direction are used in areas of dance, gymnastics and ball games
- Students also use their numeracy skills when evaluating their own performance over a period of time

Psychology

- Numeracy is covered in all units
- Descriptive statistics and their application to research methods are covered in two modules, in AS and A2. This includes standard deviation, mode, mean, range and various graphs and tables
- In the Core studies module, students are expected to understand the ramification of these statistics in terms of reliability and validity. A2 develops these skills further with an introduction to inferential statistics. Here, students are expected to understand the relationship between various research methods and the appropriate statistical tests (Mann-Whitney etc) to assess their reliability, i.e. the use and interpretation of p-values
- They are also given the chance early on to measure various psychological/physical variables, such as heart rate, stress and behavioural reinforcers

Religious Education

- Belief and likelihood in religious education relates to numeracy
- The discussion of moral and social issues can lead to the use of primary and secondary data interpretation of graphs, charts and tables helps students to make informed decisions and judgements and to recognise biased data and misleading representations

Science

- Scientific investigations and experiments require students to use their numeracy skills to classify objects, accurately measure distances and quantities, estimate outcomes and quantities when required, recording results in tables and graphs
- In Science, students will order positive and negative numbers, including decimals, calculate means of a set of data and calculate percentages of a quantity
- At a higher level students will apply their algebra skills to substitute into formulae and rearrange scientific equations
- Choosing an appropriate graph and being able to interpret data and make predictions will also take place in Science lessons

Sociology

- It is imperative students can interpret information from graphs and tables to make statistical generalisations from sociological research
- Students must be able to identify trends and changes over time, for example, students will analyse Official Crime Statistics and ascertain the most criminal area, time periods and groups most prone to crime
- Students are required to make judgements on the accuracy and value of data

Technology

- Measuring is used extensively in all areas of Technology, involving the use of both metric and imperial units.
- When making models or constructions students work in millimetres and are required to measure accurately using this unit.
- The need for plans requires students to be able to produce scale drawings and be able to draw 2D representations of 3D shapes.
- Identifying and drawing plans and elevations of 3D shapes are also used when planning project work.

- Students are also expected to be able to calculate material and manufacturing costs of producing products as one-off items and as quantity production pieces.
- Using graphs to interpret data allows for accurate designing and modelling of products to fit specific needs.
- Understanding of tessellation to reduce material wastage as well as tessellation in design is used.
- Sequencing is used when producing plans of work and methods of construction.
- When designing PowerPoint presentations students will use proportion and their knowledge of shape and space as well as an understanding of enlargement when changing the size of an object and presenting their work effectively.
- Other numerical skills are used when using formula and formatting within Excel spread sheets.