



## Numeracy across the curriculum policy

### Carmel College

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## **Definition**

There is no universally agreed definition, but National Numeracy defines numeracy as:

*...having the confidence to use basic maths at work and in everyday life.*

So, numeracy at a fundamental level means two things: having basic maths skills and feeling confident in using them.

Some examples of what numeracy is, and is not, might better illustrate this definition.

Numeracy is	Numeracy is not
Being confident with numbers at work, on your payslip, bank account, paying bills	About working things out at speed
Feeling able to challenge an incorrect bill/invoice	(just) about knowing your times tables or number bonds
Knowing how to use a calculator to work something out and then being able to assess if the answer is sensible	Having to get everything correct all the time
Knowing how to work out an estimate, and when that is sufficient	Being worried if you need to ask for help
Understanding what a percentage is and how they can be used.	About always being able to work something out in your head

People are unlikely to be confident numerically without basic numerical skills and strategies at their disposal. However, those mathematical skills are also unlikely to be developed without some already gained confidence.

It is important that we develop students' confidence alongside their numerical skills and broader mathematical curriculum. We want students to leave Carmel, not only with the best GCSE/A level grade in maths that they are capable of, but with the confidence to apply that knowledge in all aspects of their working and personal life.

## **Intent**

To raise the numeracy levels of all pupils within Carmel College.

To continue to develop a coordinated and consistent approach to numeracy across all areas of the school curriculum.

To enable all students to access the curriculum by having sufficient numerical skills to be able to do so.

To enable pupils to appreciate the relevance and importance of numeracy in helping to explain and understand their world.

## **Implementation**

### **Improving students' numeracy in the maths classroom**

- Regular retrieval of previously learned facts and techniques to develop and secure pupils' calculation strategies and rapid recall skills.
- Using display work to jog the memory
  - Questioning pupils effectively, including as many of them as possible, giving them time to think before answering, targeting individuals to take account of their attainment and needs.
  - Ask pupils to demonstrate and explain their methods and reasoning and exploring reasons for any wrong answers.
- Encourage discussion of mental strategies within 'ordinary' classwork.
- Identifying 'difficult' techniques and targeting learning of these.
- Allow sufficient time for independent work/quiet scholarship to ensure that students are required to think for themselves.
- Opportunities to include contributions from all pupils such as using MWB.
- Giving pupils strategies to learn things off by heart.
- Using review time to draw the whole class together to sort out misconceptions, identify progress and make links to other subjects.
- Links difference subject areas within maths to specific careers to highlight the usefulness/necessity of learning different topics.

## **Impact**

The aim is that by the end of a students' time at Carmel that they will possess many of the characteristics of a numerate student.

The key mathematical skills we want students to achieve by the end point are as follows:

- Have a sense of the size of number and how it fits into the number system.
- Recall mathematical facts.
- Solve mental calculations accurately.
- Solve calculations using pencil and paper methods.
- Use calculators and technology confidently.
- Estimate with confidence and use approximate values to check the validity of their calculations.
- Understand and use measures of time and speed and rates such as miles per hour, etc.
- Confidently use an understanding of ratio, proportion and scale in a variety of different contexts
- Collect different types of data and display this data in various different diagrams and charts.
- Interpret, analyse and predict from data displayed in many forms.
- Explain and justify their mathematical reasoning when calculating either routine or non-routine problems.
- Be confident in using and applying mathematics, recognising that skills are transferable across different subject areas and in a variety of contexts.

## **Characteristics Of A Numerate Student:**

- Confident and competent at performing calculations involving number;
- Can use a range of techniques to carry out computations mentally and on paper;
- Knows and understands the properties of number;

- Can explain methods and justify reasoning & conclusions, using correct mathematical terms;
- Can 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 the calculation, understanding place value;
- Can recognise and use mathematical skills and techniques in a variety of contexts;
- Is resilient and will persevere with a question if s/he initially gets it wrong.

### **The Role of the Mathematics Department is to:**

- Be aware of the mathematical techniques used in other subjects and provide assistance and advice to other departments, so a correct and consistent approach is used in all subjects;
- Liaise with other teachers to ensure pupils have appropriate numeracy skills by the time they are needed for the work in other subject areas;
- Seek opportunities to use topics from other subjects in mathematic lessons.

### **The Role of other Teachers is to:**

- Have a full appreciation of what numeracy is;
- Ensure they are familiar with correct mathematical language, notation, convention and techniques and encourage students to use these correctly in their subject
- Provide information for mathematics teachers on the stage at which specific numeracy skills will be required;
- Provide resources for mathematical teachers to enable them to use examples of applications of numeracy relating to other subject areas.

### **Numeracy in other subjects**

“Pupils’ mathematical knowledge is developed and used where appropriate, across the curriculum”.

Ofsted Handbook 2022

Opportunities to use numerical skills occur in many other subjects within the curriculum and, in fact, numeracy is a crucial part of those subjects. This is evident across all key stages of our college.

In the main, staff confidently deliver these numerical parts of their curriculum but on occasion they may need to seek advice from a maths specialist. We have a history of strong collaboration between maths and Geography, Technology and Science staff.

In order to ensure that students are best prepared maths staff may teach A level students for one or more lessons. For example, teaching the A level geographers a range of hypothesis tests so they have a variety of tests at their disposal for coursework. Maths staff have also taught A level Technology students and helped prepare them for the maths part of their exams. This is always a two- way process as maths teachers may not be familiar with some notation used in technology or some of the practical aspects of questions. A Year 8 science/maths project is currently being trialled.

Specific Areas which numeracy is used across the curriculum follow below.

The time that these are taught in the curriculum is reference in each departments' rationale.

### **Social Sciences**

- official statistics
- measures of central tendency
- measures of dispersion
- correlational analysis
- percentages, fractions, decimals, ratios & significant figures
- normal & skewed distributions, histograms, bar charts & scattergrams
- probability
- inferential statistical testing, significance

### **Computing**

#### **Year 7**

##### Programming

- Variables (you may use x and y, we will give them names)
- Arithmetic operators (+, -, \*, /)
- Order of operations
- Comparison operators (=, <, >, <=, >=)
- Boolean operators (AND, OR, NOT)

##### Data handling

- What is data?
- Hypothesis formation
- Collecting data
- Analysing data using SUM, AVERAGE, MIN, MAX in spreadsheet.
- Chart drawing using spreadsheet (Bar, Line, Pie)

## Year 8

- Programming - as year 7 but in a different programming environment.
- Data handling - As year 7 but with larger data files and different contexts
- Binary numbers - and therefore place values and number construction
- Boolean logic (AND, OR, NOT) and use in searches and circuits.

## Year 9

- Programming - As year 7 and 8 but moving more towards problem solving.
- Data representation - using binary to represent numbers, text, images, sound (any digitised data)
- Multimedia - Using maths as a way to manipulate images/sound/any data
- Algorithms for sorting and searching and comparison of each.
- Modelling and simulation - using a manipulation of numbers to represent real-world **models.**

## History

- Graphs, charts and pictograms of various kinds
- Percentages
- Time lines

## Science

- Drawing a range of types of graphs
- Analysing data, including experimental data and organic analysis
- Reading scales including electrode potentials, enzymes
- Calculating averages
- Using and rearranging formulae
- Solving equations
- Using algebraic expressions in kinetics
- Scale unit conversions
- Using logarithmic scales for acids, bases and buffers and radio active decay
- Using natural logs

## Geography

- Collect, display and interpret data

- Lines of best fit
- Rates e.g per 1000, per 100 000
- Scale
- Grid reference
- Area/distance
- Application of the four rules of number
- Population growth/Exponential growth
- Correlation
- Percentage increase
- Spearman's rank correlation coefficient
- Hypothesis Tests, Chi Squared, t-tests, Sign test,

### **Technology**

- Percentages, fractions and decimals
- Measurement
- Length, compound area and compound volume
- mass/weight
- Collect, display and interpret data
- costings
- Applications of the four rules of numbers
- Surface area of 2D and 3D shapes
- Nets of cubes and cuboids
- Trigonometry
- Ratio and Proportion
- Trigonometry

### **Business**

- Formulae
- Use of Money
- Profit, Loss, break even points



- Fractions, Decimals and Percentages
- Representing and Interpretation of data
- Applications of the four rules of number

## **PE**

KS3

- Speed, distance and time
- Calculations of training zones rather than expended energy
- Recording results
- Bearings, scales and angles through orienteering

S4

- Data collections and qualitative and quantitative data
- Interpreting graphs
- Energy and Expenditure Calculations
- Comparison to normative tables
- Pressure and partial pressure of gases