



Churchill Community College

Numeracy Policy

Churchill Community College is committed to:

- Developing, maintaining and improving standards in numeracy across the school.
- Ensuring consistency of practice, including methods, vocabulary, notation etc.
- Finding areas for collaboration between subjects.
- Assisting the transfer of students' knowledge, skills and understanding between subjects.

CHURCHILL COMMUNITY COLLEGE:

Policy on Numeracy across the Curriculum

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Background to the policy:

Numeracy is a proficiency that is developed not just in Mathematics but also in other subjects. It is more than an ability to do basic arithmetic, it also:

- involves developing a confidence and competence with numbers and measures.
- requires an understanding of the number system, a repertoire of mathematical techniques and an inclination and ability to solve quantitative or spatial problems in a variety of contexts.
- demands practical understanding of the ways in which data is gathered by counting and measuring, and is presented in graphs, diagrams, charts and tables.

Numeracy skills can be consolidated and enhanced when students have the opportunities to apply and develop them across the curriculum.

Poor numeracy skills hold back students' progress and can lower self-esteem. Improving these skills is a whole school matter so that students become confident at tackling mathematical problems in any context (see Appendix i).

The teaching of numeracy is the responsibility of all staff at Churchill Community College and this policy supports the College's drive for consistency in approaches to literacy and numeracy across the Curriculum.

It is an expectation that all departments adhere to the requirements of the Numeracy Policy. The Numeracy Coordinator is currently working with the Science and Technology Departments to develop schemes of work and numeracy opportunities within these subjects. Support and advice is available to all departments in their development of numeracy within individual subject areas.

This policy applies to: All students

Aims of the Policy:

The aims of the Numeracy Policy are:

- To secure high standards of numeracy across the College through the development of a whole school Numeracy Policy which enables all staff to access support and guidance.
- To raise the profile of numeracy and to secure high standards of numeracy across the school and to promote numeracy throughout the curriculum.
- To develop, maintain and improve standards in numeracy across the school by enhancing the quality of teaching.
- To ensure consistency of practice including methods, vocabulary and notation by developing the cross curricular use of numeracy and by identifying opportunities for numeracy in lessons and schemes of work.
- To assist in the transfer of students' knowledge, skills and understanding of numeracy between subjects.

Use of Calculators:

The Mathematics Department provides students with scientific calculators to use in Mathematics lessons when required.

In deciding when students use a calculator in lessons, staff should ensure that:

- students first resort should be mental methods;
- students have sufficient understanding of the calculation to decide the most appropriate method: mental, pencil and paper or calculator;
- students have the technical skills required to use the basic facilities of a calculator constructively and efficiently, the order in which to use keys, how to enter numbers as money, measures, fractions, etc;
- students understand the four arithmetical operations and recognise which to use to solve a particular problem;
- when using a calculator, students are aware of the processes required and are able to say whether their answer is reasonable;
- students can interpret the calculator display in context (e.g. 5.3 is £5.30 in money calculations);
- we help students, where necessary, to use the correct order of operations – especially in multi-step calculations, such as $(3.2 - 1.65) \times (15.6 - 5.77)$.

Ensuring a Consistent Approach to Numeracy across the Curriculum:

The numeracy audit has identified how, when and what is taught by the other subjects of the school curriculum. Staff in identified numerate subjects should look to include opportunities to involve numeracy whenever possible, and should look to teach numeracy skills in an agreed manner (see Appendix ii).

In order that the policy becomes whole College practice, it is important that **Curriculum Leaders** ensure that:

- Schemes of Work have opportunities for Numeracy included and identified;
- lesson plans include identified opportunities for numeracy
- all staff are aware of the Numeracy Policy and its inclusion in the subject area;
- the promotion of numeracy in lessons is included in the regular monitoring of learning and teaching and departmental self-review.
- all staff are familiar with the 'Standard Methods in Mathematics' document which supports this policy (to follow).

In addition, subject teachers will contribute to the raising of numeracy standards within their curriculum area by:

- discouraging students from writing answers only and encouraging them to show numerical working within the body of their work.
- encouraging the writing of mathematically correct statements.
- encouraging the use of estimation.

In planning to incorporate numeracy into their teaching and learning, departments must decide:

- How effectively the skills and knowledge in numeracy are consolidated and developed;
- How students' skills and knowledge in numeracy help or hinder their learning across these subjects

It must be recognised that not all learners in a particular group will have the same numerical skills.

Proficient students will not necessarily use set methods of calculation and this is not to be discouraged. Staff must appreciate that there is never only one correct method and learners are encouraged to develop their own strategies and methods where appropriate, and will not necessarily be taught *set* ways. Where a student is not proficient in a numerical method, teachers will use a standard method to support understanding. Guidance for these is provided in the supporting Document 'Standard Methods in Mathematics'.

Appendix i: Student skills summary

By Year 7, a numerate student should:

In contexts that require them to solve problems or model situations, students will be able to:

- apply additive and multiplicative strategies flexibly to whole numbers, ratios, and equivalent fractions (including percentages)
- apply additive strategies to decimals
- balance positive and negative amounts
- find and represent relationships in spatial and number patterns, using tables and graphs

By Year 9, a numerate student should:

- Recall mathematical facts confidently;
- Calculate accurately and efficiently, both mentally and with pencil and paper, drawing on a range of calculation strategies;
- Use calculators and other ICT resources appropriately and effectively, and where relevant select from the display the number of figures appropriate to the context of a calculation;
- Recognise how the generalised laws of arithmetic can be applied to the simplification or manipulation of algebraic expressions;
- Use simple formulae and substitute numbers in them;
- Estimate measurements, including angles, choosing suitable units;
- Calculate simple perimeters, areas and volumes, recognising the degree of accuracy that can be achieved;
- Understand and use measures of time and speed, and rates such as £ per hour or miles per litre;
- Recognise relationships between numbers, quantities or measurements presented in different ways;
- Use proportional reasoning to simplify and solve problems;
- Draw plane figures to given specifications and appreciate the concept of scale in geometrical drawings and maps;
- Understand the difference between the various measures of average and the purpose for which each is used;
- Collect data, discrete and continuous, and draw, interpret and predict from graphs, diagrams, charts and tables, identifying mathematical connections;
- Have some understanding of the measurement of probability and risk;
- Solve mathematical problems, including non-routine problems, choosing suitable operations, techniques and ICT resources;
- Explain their methods, reasoning and conclusions, using correct mathematical terms;
- Judge the reasonableness of their solutions and check them when necessary;
- Give their results to a degree of accuracy appropriate to the context

By Year 11, a numerate student should:

- Understand & use proportional changes expressed as fractions, decimals, percentages and ratios;
- Use the equivalence of fractions, decimals and percentages to compare proportions;
- Calculate percentages and find the outcome of a given percentage increase or decrease;
- Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole;
- Estimate calculations by rounding to one significant figure and multiplying and dividing mentally;
- Understand the effects of multiplying and dividing by numbers between 0 and 1;
- Use calculators efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation;
- Use formulae from mathematics and other subjects; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject;
- Understand & use measures of speed (and other compound measures such as density or pressures) to solve problems;
- Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction;
- Suggest a problem to explore using statistical methods, frame questions and raise conjectures;
- Select, construct and modify, on paper and using ICT, suitable graphical representation to progress an enquiry, including frequency diagrams and scatter graphs to develop further understanding of correlation;
- Compare two or more distributions and make inferences;
- Demonstrate sound numerical skills and use a calculator effectively;
- Apply ideas of proportionality to numerical problems;
- Identify relevant information, select appropriate representations and apply appropriate methods and knowledge. Use different methods of mathematical communication;
- Tackle problems that bring aspects of mathematics together; identify strategies to solve problems involving a limited number of variables; communicate the chosen strategy, making changes as necessary

By Key Stage 5, a numerate student should:

- Understand & use proportional changes expressed as fractions, decimals, percentages and ratios;
- Use the equivalence of fractions, decimals and percentages to compare proportions;
- Calculate percentages and find the outcome of a given percentage increase or decrease;
- Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole;
- Estimate calculations by rounding to one significant figure and multiplying and dividing mentally;
- Understand the effects of multiplying and dividing by numbers between 0 and 1;
- Use calculators efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation;
- Use formulae from mathematics and other subjects; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject;
- Understand & use measures of speed (and other compound measures such as density or pressures) to solve problems;
- Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction;
- Suggest a problem to explore using statistical methods, frame questions and raise conjectures in mathematics and other subjects, including the Extended Project Qualification.
- Select, construct and modify, on paper and using ICT, suitable graphical representation to progress an enquiry, including frequency diagrams and scatter graphs to develop further understanding of correlation;
- Compare two or more distributions and make inferences;
- Demonstrate sound numerical skills and use a calculator effectively;
- Apply ideas of proportionality to numerical problems;
- Identify relevant information (for example, government statistics), select appropriate representations and apply appropriate methods and knowledge. Use different methods of mathematical communication;
- Tackle problems that bring aspects of mathematics together; identify strategies to solve problems involving a limited number of variables; communicate the chosen strategy, making changes as necessary in mathematics and other subjects, including the Extended Project Qualification.

Appendix ii: Identified areas for numeracy across the Curriculum

The departments below have identified the following opportunities to incorporate numeracy into teaching and learning:

Science:

- Use standard measures to find length, mass, time, force, temperature, area or capacity;
- Manipulate numerical data from their experiments and do calculations;
- Use mathematical symbols and notation, construct and interpret graphs and charts.

In art, evidence will arise when students:

- Use standard measures to find length
- Form repeating patterns, making use of reflection, rotation and translation.

Design and Technology:

- Use standard measures (metric and imperial) to find length, mass, time, force, temperature, area or capacity.
- Use mathematical symbols and notation, construct and interpret graphs and charts.
- Use scale and ratio to produce drawings.

ICT:

- Use mathematical symbols and notation, construct and interpret graphs and charts.
- Use formulae to interpret data in spreadsheets.

History:

- Use timelines and interpret negative numbers (AD and BC)
- Use scale to interpret maps and diagrams
- Use mathematical symbols and notation, construct and interpret graphs and charts.

Geography:

- Use mathematical symbols and notation, construct and interpret graphs and charts.
- Use grids to identify position.
- Use negative numbers to interpret below sea level.
- Use standard measures (metric and imperial) to find length, mass, time, force, temperature area or capacity.

PE:

- Use time, height and distance in measurements.
- Use graphs to investigate performance changes over time

Philosophy and Ethics:

- Use timelines and interpret negative numbers (AD and BC)

PHSE and citizenship:

- Use mathematical symbols and notation, construct and interpret graphs and charts.
- Use standard measures (metric and imperial) to find length, mass, time, force, temperature area or capacity.

Monitoring of impact:

The policy should be monitored by the Numeracy Co-ordinator.

Date of next policy review: April 2015