

Horizon Community College

Numeracy Policy



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ASSESSMENT AND FEEDBACK POLICY

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Section 1 Ethos – Statement of Intent

Ethos

The Quality of Education team at Horizon exists to ensure a high quality of education is delivered to all students. We aim to consistently achieve the goal of “challenging every learner, every lesson, every day”.

Mathematics department ethos

To provide the best teaching for all learners at all stages and become a leading department in teaching and learning. To put students first and teach mathematics for understanding. To continue to improve and develop in order to provide the best opportunities for our students.

Statement of Intent

Horizon 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.
- Ensuring that all teachers are teachers of numeracy.

Teachers will use every relevant subject to develop students’ mathematical fluency. Confidence in numeracy and other mathematical skills is a precondition of success across the national curriculum.

Section 2 Roles and Responsibilities

The Quality of Education Team will be responsible for the day-to-day implementation and management of this Numeracy Policy and procedures.

The Quality of Education Team will be responsible for liaising with teachers across all of the departments to facilitate the delivery of cross-curricular numeracy skills.

The mathematics department will be responsible for teaching basic mathematics skills.

The Heads of School will be responsible for the further development of financial awareness through the Personal Development Programme.

All teachers will be responsible for making and taking opportunities to develop numeracy skills across their subjects.

Section 3 Definitions

Numeracy is the capacity to take mathematics and apply knowledge, skills and strategies to deal with everyday life in a variety of situations.

For the purposes of this policy, numeracy has been sub-divided into four key areas: Handling Information, Shape, Space and Measure, Operations and Calculations and Numbers.

For the purpose of this policy, we have identified three core skills: Reasoning, Problem Solving and Decision-making.

Numerate students are able to:

- Understand the size of a number and where it fits into the number system
- Read numbers correctly from a range of equipment
- Know and recall basic number facts and use mental arithmetic
- Use calculators and other equipment to solve mathematical problems
- Work confidently with the four operations (+, -, x and ÷)
- Know and recall their times tables up to 12 x 12
- Know and recall their square numbers and the corresponding square roots up to 15 x 15
- Know when answers are reasonable and give accurate results
- Manipulate algebraic expressions and simple formulae
- Understand and use correct mathematical notation and terminology
- Explain methods, reasoning and conclusions
- Use units of measurement of length, angle, mass, capacity and time
- Suggest suitable units for measuring

- Make sensible estimates of measurements and measure accurately using a range of apparatus
- Understand and use compound measures and rates
- Use simple formulae and substitute numbers in them
- Measure and estimate measurements, choosing suitable units, and calculate simple perimeters, areas and volumes
- Understand 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
- Effectively use proportional reasoning
- Understand the equivalence between fractions, decimals and percentages and use the latter in a variety of situations
- Collect data, draw, interpret and predict from graphs, diagrams, charts and tables
- Understand probability and risk

Numerate students are able to deal with numbers in real life situations, such as:

- Calculating change when shopping
- Creating a household budget
- Calculating compound interest on a loan
- Calculating interest on savings
- Deciding which gas / electricity supplier to use
- Understanding interest rates when opening a bank account
- Recovering from debt

Section 4 Curriculum Overviews

Subject Leaders will create curriculum overviews that include the numeracy skills required within a subject.

Based on the curriculum overviews, the Subject Leader will work with the Quality of Education Team to ensure that the agreed consistent methods, expectations, and definitions are used.

Section 5 Our Commitment to Developing Numeracy

We will ensure that all members of staff:

- adhere to the school's numeracy policy and corporate methods
- create a positive environment that celebrates numeracy and provides students with role-models by celebrating the numeracy successes of older students
- plan activities to allow students to learn and practice their numeracy skills
- publicly display (and share through social media) examples of high-quality numeracy work from across the curriculum

Individual departments will:

- ensure that they are teaching mathematics in a clear and consistent way, as set out by the Quality of Education team in the supporting numeracy methods booklet
- highlight the opportunities for the use of numeracy within their subject and ensure that the learning materials that are presented to students match both their capability in the subject and their numerical demands

All members of staff will:

- have high expectations of all their students and ensure that the numerical content of their lesson is of high standard
- encourage students to show their numerical working out where relevant and encourage the use of estimation, particularly for checking work
- encourage students to write mathematically correct statements and to vocalise their mathematics
- encourage students to use non-calculator methods wherever possible

- inform the Quality of Education Team as soon as possible if any numeracy problems are identified

Section 6 Key Stage 3

Students at key stage 3 will be taught the following numeracy skills across the curriculum:

- Place value, ordering and rounding
- Calculations with whole numbers and decimals
- Fractions, decimals, percentages, ratios and proportions
- Calculator methods
- Reasoning and generalising
- Measures
- Coordinates
- Transformations
- Handling data
- Applying mathematics
- Checking results

In mathematics, students at key stage 3 will be taught to:

Develop fluency in mathematics by:

- Learning to consolidate numerical and mathematical skills learned at primary school and developing further understanding of the number system and place value to include decimals, fractions, powers and roots
- Developing an ability to use appropriate calculation methods to solve increasingly difficult problems
- Using algebra to generalise the structure of arithmetic
- Substituting values in expressions, rearranging and simplifying expressions, and solving equations

- Moving freely between different numerical, algebraic, graphical and diagrammatic representations
- Using mathematical language

Reason mathematically by:

- Increasing their understanding of the number system
- Make connections between number relationships and their algebraic and graphical representations
- Developing their knowledge of ratio and proportion, in working with measures and geometry, and in formulating proportional relations algebraically
- Identifying variables and expressing relations between variables algebraically
- Making and testing estimations about patterns and relationships and looking for proofs or counter-examples
- Learning deductive reasoning
- Interpreting when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- Exploring what can and cannot be inferred in statistical and probabilistic settings, and beginning to express their arguments formally

Solve problems and make decisions by:

- Developing their mathematical knowledge through problem solving and evaluating the outcomes
- Developing their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- Beginning to model situations mathematically and learning to express the results using a range of formal mathematical representations
- Selecting appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems

Section 7 Key Stage 4

Students will be taught to:

Use correct mathematical representation by:

- Identifying the mathematical aspects of the situation or problem
- Comparing and evaluating representations of a situation before making a choice
- Simplifying the situation or problem in order to represent it mathematically using appropriate variables, symbols, diagrams and models
- Selecting mathematical information, methods, tools and models to use

Analyse mathematically by:

- Making connections within mathematics
- Using knowledge of related problems
- Visualising and working with dynamic images
- Identifying and classifying patterns
- Making and justifying conjectures and generalisations, considering special cases and counter-examples
- Exploring the effects of varying values and looking for invariance and covariance
- Taking account of feedback and learning from mistakes
- Working logically towards results and solutions, recognising the impact of constraints and assumptions
- Identifying a range of techniques that could be used to tackle a problem, appreciating that more than one approach may be necessary
- Reasoning inductively, deducing and proving

Use appropriate mathematical procedures by:

- Making accurate mathematical diagrams, graphs and constructions on paper and on screen

- Calculating accurately, using mental methods or calculating devices as appropriate
- Manipulating numbers, algebraic expressions and equations and applying routine algorithms
- Using accurate notation, including correct syntax when using ICT to record methods, solutions and conclusions
- Estimating, approximating and checking working

Interpreting and evaluating data by:

- Creating convincing arguments to justify findings and general statements
- Considering the assumptions made and the appropriateness and accuracy of results and conclusions
- Appreciating the strength of empirical evidence and distinguishing between evidence and proof
- Finding patterns and exceptions in data
- Relating their findings to the original question or conjecture, and indicating reliability
- Making sense of someone else's findings and judging their value in the light of the evidence they present
- Critically examining strategies adopted

Communicating and reflecting on data by:

- Using a range of formats to communicate findings to different audiences
- Engaging in mathematical discussion
- Considering the elegance and efficiency of alternative solutions
- Looking for equivalence in relation to both the different approaches to the problem and different problems with similar structures
- Giving examples of similar contexts they have previously encountered and identifying how these contexts differed from, or were similar to, the current situation and how and why the same, or different, strategies were used

Supporting Documentation

This policy will be supported by the following two documents:

- A numeracy action plan. This will be reviewed three times during each academic year and rewritten every year to be in line with current priorities.
- A HCAT Corporate Methods guide. This document is stored on the Teaching and Learning Staff Hub and is kept up to date by the Quality of Education Team. It will set out a consistent way to use and apply mathematical methods across the curriculum.

Appendix Key Terminology

Handling information

This is about graphs and charts, comparing sets of data and types of data, processing data, and probability. Within graphs and charts, you might look at pie and bar charts. You might look at interpreting information, you might look at data in lists and tables, and you might look at reading scales.

Within comparing sets of data and types of data, you might look at measures of averages, measures of spread, discrete data and continuous data. Within processing data, you might look at decision trees and Venn diagrams. Within probability, you might look at using a probability scale, estimating probability from statistical information, and experimental probability.

Space, shape and measurements

Within measurements, you might look at standard units of measurements for length, mass, capacity, time, temperature, and area and perimeter, and consider both metric and imperial measurements. You might select and use measuring instruments and look at how to interpret numbers and read scales. You might also look at volume.

Within shape and space, you might look at coordinates to describe a position, at simple positional language, at symmetry and at 2D and 3D shapes.

You may also look at angles. Solving problems with space, shape and measurements might involve selecting and using appropriate skills to solve geographical problems. It might involve using geographical notation and symbols correctly.

Operations and calculations

This is about addition and subtraction, multiplication and division, number operations, and the effective use of calculators. Within addition and subtraction, you might look at knowing plus and minus facts to 20, at mental methods to 100, and at whole numbers to 1,000 and beyond.

Within multiplication and division, you might look at knowing multiply and divide facts to 20, and remainders and rounding. Within number operations you might look at inverse operations, inter-relationships and order of operations. Within the effective use of calculators, you might look at calculations with fractions, decimals and percentages, and calculations with negatives.

Numbers

Numbers (and the use of the number system) is about using numbers, whole numbers, size and order, place value, patterns and sequences, and numbers “in between” whole numbers. Within using numbers, you might look at reading and writing using symbols and labels, at ratio and proportion, at using numbers for measuring and for counting, and for ratio and proportion.

Within whole numbers and size and order you might look at comparing and ordering and using number lines. Within place value you might look at zero as a place holder, at money context, at measures and at estimation. Within sequences and patterns, you might look at odd and even, at square numbers, at factors and multiples and at prime numbers. And within numbers “in between” whole numbers you might look at fractions, decimals and percentages.

Three key numeracy skills

Numeracy encompasses three sets of skills: reasoning, problem-solving and decision-making.

Reasoning might involve identifying structures, being systematic, searching for patterns, developing logical thinking, and predicting and checking. **Problem-solving** might involve identifying the information needed to carry out a task, breaking down a problem or task into smaller parts, interpreting solutions in context, and making mental estimates to check the reasonableness of an answer. And **Decision-making** might involve choosing appropriate strategies, identifying relevant information and choosing the right tools and equipment.