



**Magna Academy
Poole**
an Aspirations Academy

Numeracy Policy 2020-2021

Magna Academy Poole

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Introduction

Numeracy is the ability to use mathematics in everyday life. It means having the competence and skills to use mathematics to solve everyday problems (see Appendix 1). Numeracy is as important as literacy - it's sometimes called 'mathematical literacy' and is an essential life skill.

Numeracy means understanding how mathematics is used in the real world and being able to apply it to make the best possible decisions. It's as much about thinking and reasoning as about 'doing sums'. It means being able to:

- Interpret data, charts and diagrams
- Process information
- Solve problems
- Check answers
- Understand and explain solutions
- Make decisions based on logical thinking and reasoning

1. Vision

At Magna Academy Poole we are acutely aware of the need for students to possess effective numeracy skills, and thus have a relentless focus on improving these skills so that every student is supported to achieve the highest possible outcomes, regardless of their socio-economic background.

The ability to have logical thinking skills needed for problem solving, alongside strong arithmetic is a fundamental requirement to ensure students can access the curriculum.

At Magna, we strive to develop students' numeracy skills to the highest standard through our culture and curriculum, both as an integrated pedagogy and as a discrete entity, thereby supporting our academy vision to have a transformational impact on our students' lives.

Our vision and framework for numeracy development are also closely linked to our academy mantras:

- Work hard be kind
- Excellence is a habit
- Empowered by knowledge
- Aspire and achieve

We believe that through hard work, a growth mindset and resilience, supported by our framework and culture of high aspirations, students can achieve whatever they set their minds to, and this includes breaking down the barriers of numeracy.

2. Rationale

All staff are responsible for the promotion of numeracy through high expectations of structured work, accuracy in calculations and the use of correct mathematical terminology.

The purpose of this policy is to ensure clarity of whole-academy systems and strategies to support the numeracy of all students.

Evidence and recommendations from the Educational Endowment Foundation (EEF) has stated particular topics and teaching strategies should emphasise the many connections between different mathematical facts, procedures, and concepts to create a rich network of mathematical knowledge.

In addition, they have stated that quick retrieval of number facts is important for success in mathematics. It is likely that pupils who have problems retrieving addition, subtraction, multiplication, and division facts, including number bonds and multiples, will have difficulty understanding and using mathematical concepts they encounter later on in their studies.

All strategies and initiatives are also embedded in our Teaching & Learning framework so that nothing is an add-on, but are an integral part of students' daily curriculum. Additional key reading that has guided this numeracy policy includes: NCETM, National Numeracy Strategy, Teaching like a champion (TLAC 2.0 by Doug Lemov) and six mastery fundamentals (The Learning Scientists).

3. Aims of the Magna Academy Numeracy Policy

- To ensure all students at Magna are effective problem solvers, can make critical judgments when using mathematical techniques and can apply and use this theory in real-life situations.
- To support the transfer of students' knowledge, skills and understanding of numeracy between subjects.
- To highlight areas for collaboration between subjects.
- To ensure consistency when practising methods and using vocabulary and notation throughout the academy.
- To identify how the academy aims to raise the standards of students' numeracy.
- To ensure students achieve their highest potential GCSE or A Level grade.

4a. Characteristics of good practice in Numeracy

A consistent whole-academy approach towards mathematical language, methods, structure of written work and calculator usage is reinforced by the Mathematics Department. For example:

Language

We must be consistent in using the correct mathematical language at all times.

- When referring to decimals, say “three point one four” rather than “three point fourteen”.
- Read numbers out in full, so for 3400 say “three thousand, four hundred” rather than “three, four, zero, zero”.
- When referring to a number rather than an operation, use the terminology negative 7, not minus 7, unless talking about temperature.
- Encourage pupils to be less dependent on simple words e.g. exposing them to the word “multiplied by” as a replacement for “times”.
- Highlighting word sources e.g. quad means 4, lateral means side so that pupils can use them to help remember meanings. This applies to both prefixes and suffixes.
- Discussion about words that have different meanings in Mathematics from everyday life e.g. take away, product, similar etc.

Calculators and other Mathematical equipment

- In order to improve numeracy skills, it is essential that students are encouraged to use non-calculator methods whenever possible.
- Written and mental calculation methods are taught in a significant amount of Key Stage 3 topics. However, it should be noted that the Maths GCSE allows calculator usage for two out of the three examination papers and as such students must practise using their calculators correctly to solve difficult problems.
- All students are required to have a calculator, ruler, protractor and compass, as well as the usual pens and pencils. This ensures that students are fully prepared for all topics covered in Maths as well as other subjects that have a numeracy element.

Methods

- It is important that all departments follow the advice on the structure of written work from the Mathematics Department. This will enable the academy to work consistently in all mathematical calculations and avoid any confusion for students.

Structure of written work

- It is essential that the key formula or information is stated at the start of every calculation (where appropriate).
- Workings must be clearly shown for every stage/step when solving a problem.
- In all calculations, a vertical layout is established and the importance of place value and neat column keeping should be stressed.

e.g $£3.50 \times 0.85 + £3.50$

This is poor practice: $£3.50 \times 0.85 = 2.975 + 3.50 = 6.475 = £6.48$

This is good practice: $3.50 \times 0.85 + 3.50$

	= 2.975
	+ 3.50
	<u>6.475</u>
	= £6.48

4b. Raising Attainment Strategies

Magna Academy employs a number of strategies to raise attainment in numeracy as described below:

- Tutor time numeracy activities for years 7-10 are fully embedded across the academy.
- Homework - The Maths department sets weekly 'drill' homework sheets, consisting of 40-50 maths questions across various topic areas. The questions progress in levels of challenge throughout the academy year. These are produced in booklet form with an exemplar and six weeks (one unit) of homework sheets bound together. This format has ensured high levels of completion amongst students.
- Online Maths Homework - In addition to the printed homework booklets, Magna Academy also uses Hegarty Maths. The website set-up is that students watch a video on a topic area and then answer questions on that topic. Teachers typically set two tasks per week, per class. These tasks will be chosen to reinforce work covered recently in class. This allows students to practice what they have been learning and get extra help from the videos if they have misunderstood a topic.
- Raising Attainment ('RA') sessions in Maths run throughout the academy year and are open to all Year 11 students. These sessions are one hour long, occur every week at the end of the academy day. They are staffed and managed by the Maths Department and have a high level of student attendance. Groups of similar ability students revise topics relevant to their Higher or Foundation course.
- Intervention sessions occur during the academy week. Students who are not meeting their expected progress receive extra support individually or in very small groups.

These are scheduled sessions and all students who receive intervention have a personalised timetable of these.

- Regular progress and attainment assessments are held at the end of every six week unit using past examination questions so that students become familiar with examiner style questions and can dissect the question correctly.
- Teachers maintain class files containing information about their students (Pupil Premium, SEND issues, EAL) which helps to guide pedagogical decisions.

5a. Department of Mathematics

The Mathematics Department's systems promote numeracy through:

Teaching and Learning

- Creating a positive learning environment of high challenge but low threat.
- Embedding a growth mindset in students so that they are resilient mathematicians that strive to attempt more complex problems.
- Maintaining a positive and attractive environment that celebrates numeracy.
- Having a rigorous scheme of work aimed at stretching and challenging all students so that they achieve their best in mathematics.
- The curriculum is cyclical in design which enables topics to be revisited.
- Providing information about common misconceptions and errors which may occur during teaching of specific topics.
- Utilising e-learning as a vital tool of their studies with Hegarty Maths as the main program to support mathematical understanding.
- Providing numeracy packs for every student in years 7 to 10 for use in tutor time. These numeracy packs aim to develop the students' mental calculation strategies and use various online resources including Numeracy Ninjas and Times Table Rockstars. Additional differentiated resources are used by the Mathematics Department and are tailored to students on both Higher and Foundation pathways.
- Promoting 'Maths Literacy' in years 7 to 9 with regular testing of spelling of the key 80 words used in Mathematics. Definitions of the words are reinforced by teachers during spelling tests.

Cross-curricular links

- Seeking opportunities to use topics and examination questions from other subjects in mathematics lessons.
- Being aware of the mathematical techniques used in other subjects and providing guidance and training to other departments so that a sound, coherent and consistent approach is used in all subjects.
- Providing guidance to other departments on what numeracy skills pupils are expected to have acquired by any given stage, so that teachers know whether a skill needs teaching for the first time or reinforcing.

5b. Whole-academy Numeracy

Numeracy Coordinator Role

To ensure that the correct method of teaching mathematics is consistent across all subjects that enables students to fully develop their mathematical skills. In addition, the numeracy needs within all subjects are continuously reviewed so that all schemes of work link together to ensure an effective whole-academy approach to numeracy. Another aspect of this role is to raise the profile of numeracy and link it to nation and global events throughout the year, making students aware of the importance of numeracy; discoveries and usage of mathematics throughout history and the importance of numeracy needed for their future.

Numeracy is a whole-academy responsibility and it is important that teachers in all subjects are aware of their contribution to raising students' attainment in numeracy. The following aspects of numeracy arise in:

- Art - Symmetry; other transformations; paint mixtures as a ratio
- Geography - Representing data; finding averages; use of spreadsheets
- History - Timelines; sequencing events
- MFL - Dates; counting in other languages
- PE - Collecting and analysing real data; timings of activities and percentages; measuring heart/respiratory/blood pressure volumes/rates; calculating training zones and presenting data in graph form.
- Science - Formulae; calculating means and percentages; calculating with positive, negative and decimals; substitution; rearranging formulae; collecting and representing data.
- DT - Measurement; properties of shape; scaling and ratio.
- English - Identifying important information in a text will help them to better understand problem solving questions.
- Business - Handling data regarding the economy; Profit and loss
- Travel and Tourism - presenting and analysing data
- Applied Transdisciplinary Learning (ATL) - Collating, analysing and handling data.

Mathematical skills are enhanced when students have the opportunity to apply and develop their skills across the curriculum. Poor numeracy skills can hold back a student's progress and fundamentally lower self-esteem.

Numerical skills are also enhanced during tutor times. Magna currently has the following numeracy activities embedded in their timetable:

- Year 7 - Times Tables Rockstars - Two sessions per week.
- Year 8 - Numeracy Ninjas - Two sessions per week
- Year 9 - Numeracy Ninjas - Two sessions per week
- Year 10 - A ten question numeracy quiz (Foundation and Higher is provided)- One session per week

All of these resources are produced by the Mathematics Department and supplied to the Head of Years and their tutors in a 'unit booklet' for every student in the academy. This has helped to embed the routine of practising numeracy outside of Maths lessons.

5c. Post 16 Study and Student Futures

- Magna Academy Sixth Form offers Mathematics at A-Level and Mathematics continues to be the most popular choice for A-levels at Magna and nationally.
- When considering which A Levels require higher levels of numeracy, students will be advised on these and which combination will be suitable for specific careers. In addition, further support and guidance will be provided on specific university courses should they wish to continue their studies into Higher Education.
- Mathematics is suitable with most A level subjects. At Magna, students tend to include Mathematics with at least one other Science. It is essential that students wishing to pursue a career or degree in Engineering opt for Mathematics and Physics as two of their three A Level subject choices.
- Students will learn about Labour Market Information to help inform their future pathways. Students will interpret data to identify trends in employment to understand how the economy is changing and to calculate growth areas in the economy. Students will gain an understanding of pay and through knowledge of minimum wages and average salaries and will be able to evaluate the relative financial remuneration of different employment sectors.
- Students will understand that different pathways will lead to higher lifetime earnings and will evaluate this factor against other factors in decisions about future pathways. Students will understand the financial costs of attending university and will assess these fees against potential earnings. Students will learn what the minimum and average wages are for apprentices and assess the benefits of short and longer term earnings in comparison with other options. Students will learn about student loan repayment schemes including interest rates.
- Students will interpret a whole range of data when making choices about higher education establishments and choice of courses. Students will compare statistical information in league tables measuring: entry standards, student satisfaction, research quality, research intensity and graduate prospects.
- Students will learn about the costs of independent living and will practice budgeting taking into account possible outgoings and earnings of a young person.

6. Assessments, Tracking and Progress

The progress of all students in Key Stages 3 & 4 is tracked and set against achieving a FFT5 grade and for Key Stage 5, the Alps Connect minimum expected grade. This provides an ambitious goal to aim towards. In terms of Mathematics (as opposed to whole-academy numeracy) tracking consists of the end of unit interleaved Topic Assessment or Mock Examination.

Tracking and intervention

- Student progress is recorded from the start of year 7 through to year 13 - every six weeks with a percentage score and grade.
- Setting is established in year 7 and is based on prior attainment, FFT5 target grade, GL Assessments and internal assessments. Classes are regularly reviewed to ensure students are in the correct set.

Further Support

- Continuous tracking will help to identify students that require further support. This intervention is provided by Maths teachers after academy or throughout the academy and the Phoenix Centre.
- Early identification of students with possible learning difficulties (provided through GL Assessments and SEN referral) will trigger additional screening, for example dyscalculia.
- Direct Instruction is also used in Key Stage 3 for students that require support in strengthening their basic number work. Pupils are tested to ascertain whether they require this specific support.

Most Able Intervention

- Continuous tracking of students using assessment data and teacher judgement will ensure that students are initially monitored and then identified as Mathematically Most Able.
- Enrichment opportunities are provided for students; for example UKMT & Cipher Challenges.
- A weekly Maths Club is provided for students who are interested in tackling interesting problems by developing new maths skills.

7. Measuring Impact

It is essential that the impact of our whole-academy numeracy policy is measured and reviewed. Below is a summary of the main activities undertaken:

- Termly GL assessments for Year 7 and 8 students with impact report.
- Regular work scrutinies across all year groups and subjects for numeracy (including homework booklets).
- Lesson observations with a focus on numeracy.
- Termly review and impact report on key numeracy strategies (part of Teaching & Learning reviews)

8. Staff CPD

All tutors receive guidance on how to use the numeracy pack in tutor time. Mathematics teachers also receive training every two weeks as part of Magna's CPD programme.

Direct Instruction is also provided for the teachers delivering this specialist intervention course for our weakest students in Years 7, 8 & 9.

The Numeracy Coordinator will provide support and guidance to subjects so that there is a consistent approach and that schemes of work complement each other.

This policy outlines the key strategies to be used in the classroom and forms the basis for training.

9. Quality Assurance

The Vice Principal in charge of numeracy alongside the Academic Director for Mathematics and Numeracy Coordinator ensures the overall implementation of the main provisions of the policy. Senior Leaders and those with a TLR closely monitor and evaluate the quality of numeracy development in their areas and/or across the Academy. This is monitored through the academy Quality Assurance policy.

10. Post-lockdown numeracy guidance

This advice from NCETM provides some useful guidance on numeracy issues for teachers to consider post-covid lockdown:

- Try to avoid ‘rushing through’ a crowded scheme of work to ‘catch up’; this is ineffective and can be demotivating.
- Instead, try to focus on securing students’ deep conceptual understanding in key topics which prepare the way for future learning.
- Finding out where students have made progress. Teachers will need to be aware that students’ experiences during academy closures and ongoing disruption will be very varied. Some may be apprehensive about returning to the classroom; some will be concerned about content they may have missed.
- Try to avoid making general assumptions about the learning they may or may not have done during this time.
- Try to avoid setting formal tests too early. Instead, try to focus on in-class observations, questioning and checking to find out about students’ understanding and attainment; this will inform planning and reinvigorate student learning in a supportive way. Look out for wider gaps, a prior attainment picture that is more mixed and look out for surprises – some students will have progressed in unexpected areas.
- Recovery pedagogy research shows that ‘lockdown provided very limited opportunities for any pupils to engage in mathematical talk, metacognitive activities or receive formative feedback’.
- Teachers will need to be aware that after sustained disruptions when much of students’ learning has been in isolation, it will be important to make the most of opportunities for interactive, meaningful and collaborative learning.
- Mathematical talk is a very important part of learning. Students who discuss and debate mathematical ideas grow in confidence, understanding and attainment.
- Try to make the most of the opportunities where learning is interactive and takes place in whole class or group collaborative settings and where students can talk about their maths and share their ideas.
- Students also need time to get used to the new expectations too.

Appendix 1- Numeracy situations in everyday life

When do we use numeracy?	Examples
At work	Giving correct change, weighing and measuring, using spreadsheets and understanding data.
In practical everyday activities at home and beyond	Working out how many minutes until our train, increasing a recipe to serve extra guests.
As consumers	Understanding how much we'll save with a 15% discount, checking we've received the right change, working out how much to tip in a restaurant.
In managing our finances	Setting and keeping to a budget, understanding interest rates, understanding the financial implications of borrowing money, working out how much money to put into a pension.
As parents	Helping children with homework, playing board and puzzle games with children.
As patients making sense of health information	Managing our diet and nutrition, making and keeping medical appointments, measuring medicine doses, working out a routine for taking tablets regularly.
As citizens understanding the world about us	Making sense of statistics and graphs in the news, understanding information about government spending.