

# Numeracy Strategy

## Document Control

This document is issued, controlled and impact assessed by the Leadership Team.

The latest version of the procedure will be maintained on the School Website.

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## Scope

The Academy opened in January 2018. Given performance of local schools it is evident that student numeracy will be a key issue for the school and its development and progress.

The education system has seen major changes over the past few years. There is on-going reform of GCSE qualifications however throughout all of this change, the development of numeracy skills remains central to a young person's life chances. Without good numeracy skills full participation in the workplace and society as an adult will be a constant struggle. The Academy needs a whole school numeracy strategy which will be implemented systematically across the curriculum and all teachers should view themselves as teachers of numeracy, regardless of their subject specialism. It is vital that we understand that numeracy is of personal, social and economic importance.

## Purpose

The purpose of our whole-school numeracy strategy:

- to develop, maintain and improve standards in numeracy across the school;
- to ensure consistency of practice including methods, vocabulary, notation, etc.;
- to indicate areas for collaboration between subjects;
- to assist the transfer of students' knowledge, skills and understanding between subjects.

## Contextual Information:

The development of the concept of "numeracy":

1959 – (Crowther report) - Numeracy is defined as a word to represent the mirror image of literacy.

1982 – (Cockcroft report) - A numerate pupil is one who has the ability to cope confidently with the mathematical needs of adult life. There was an emphasis on the wider aspects of numeracy and not purely the skills of computation.

1995 (OED) – numerate means acquainted with the basic principles of Mathematics

## A current definition of numeracy:

Numeracy is a proficiency which is developed mainly in mathematics but also in other subjects. It is more than an ability to do basic arithmetic. It involves developing confidence and competence with numbers and measures. 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.

## Practice at Endeavour Academy

### Raising Standards

Raising Standards in Numeracy across our school cannot be solely judged in increased test percentages. There is a need to evaluate the students' ability to transfer mathematical skills into other subject areas, applying techniques to problem solving. Their confidence in attempting this is initially as important as achieving the correct solution. Pupil interviews and work sampling will be the main processes for evaluating the success of our practice.

There are some key roles within school that will ensure that this policy is effective and becomes a well-established part of our school practice.

The Senior Leadership Team has a commitment to the implementation and evaluation of this work. They are aware of the need to create time for liaison and sustain the cross curricular links forged between subject areas. The effectiveness of these links will reduce the replication of work by teachers and students.

Pilot work in many schools has shown that a designated person with oversight of "Numeracy across the Curriculum" has led to effective practice and positive change. The school has elected the teacher of Mathematics to this role.

## Consistency of Practice

The Mathematical Association recommend that teachers of Mathematics and teachers of other subjects co-operate on agreed strategies.

In particular that:

### **Teachers of mathematics should:**

1. be aware of the mathematical techniques used in other subjects and provide assistance and advice to other departments, so that a correct and consistent approach is used in all subjects.
2. provide information to other subject teachers on appropriate expectations of students and difficulties likely to be experienced in various age and ability groups.
3. through liaison with other teachers, attempt to ensure that students have appropriate numeracy skills by the time they are needed for work in other subject areas.
4. seek opportunities to use topics and examination questions from other subjects in mathematics lessons.

### **Teachers of subjects other than mathematics should:**

1. ensure that they are familiar with correct Mathematical language, notation, conventions and techniques, relating to their own subject, and encourage students to use these correctly.
2. be aware of appropriate expectations of students and difficulties that might be experienced with numeracy skills.
3. provide information for all teachers on the stage at which specific numeracy skills will be required for particular groups.
4. provide resources for and use examples of applications of numeracy relating to other subjects in Mathematics lessons.

## Our Areas of Collaboration:

### Mental Arithmetic Techniques

Staff training will take place on the variety of arithmetical techniques used by students. There is an acceptance that students are able to tackle the same questions with a variety of methods. These approaches rely on mixing skills, ideas and facts; this is done by students drawing on their personal preferences and the particular question. All subject leads should give every encouragement to students using mental techniques but must also ensure that they are guided towards efficient methods and do not attempt convoluted mental techniques when a written or calculator method is required.

### Written Calculations

Again staff training will be undertaken on the initial Numeracy across the Curriculum Strategy.

### Role & Use of Calculators

Endeavour Academy will ensure consistent practice on the use of calculators. Consideration of these 4 questions, and the policy below, will help them with this.

- a) Does the Mathematics department ban or limit the use of calculators?
- b) Where in your subject do you expect students to be able to use a calculator?
- c) Are there, and should there be, situations in your subject when you would not wish students to use calculators?
- d) Are the calculator skills required of students in line with expectations in the *Framework for teaching mathematics*?

In simple terms, subject leads need to decide and then plan into each module of work whether calculators are banned, ignored, allowed, encouraged or compulsory!

### Whole School Policy on the use of calculators

The school has a supply of scientific calculator for students to use in lessons when required.

In deciding when students use a calculator in lessons we 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  $(3.2 - 1.65) \times (15.6 - 5.77)$ .

## Vocabulary

Mathematics teachers will emphasise literacy skills when tackling Mathematical problems. Keywords are emphasised and their spellings and meanings reinforced. The problems are broken down into manageable chunks with emphasis on how best to layout their answers which assists students to gain confidence answering the longer questions they are faced with.

The following are all important aspects of helping students with the technical vocabulary of Mathematics:

- Use of Word walls (key words on display in classrooms)
- Using a variety of words that have the same meaning e.g. add, plus, sum
- Encouraging students to be less dependent on simple words e.g. exposing them to the word multiply as a replacement for times
- Discussion about words that have different meanings in Mathematics from everyday life e.g. take away, volume, product etc
- Highlighting word sources e.g. quad means 4, lateral means side so that students can use them to help remember meanings. This applies to both prefixes and suffixes to words.

Students should become confident that they know what a word means so that they can follow the instructions in a given question or interpret a Mathematical problem. For example a pupil reading a question including the word perimeter should immediately recall what that is and start to think about the concept rather than struggling with the word and then wondering what it means and losing confidence in his / her ability to answer the question. The instant recall of vocabulary and meanings can be improved through flash card activities in starters. Try to do this twice a half term with each group; this may be key vocabulary at the start of a unit of work or recalling vocabulary from previous mathematics.

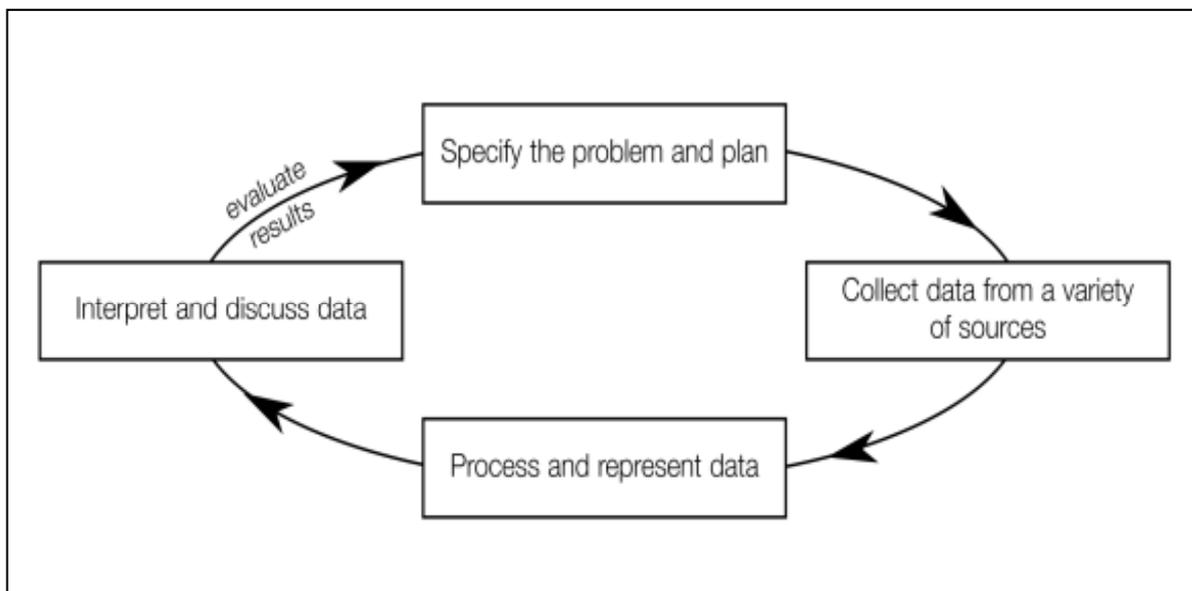
## Measures

Technology teachers have traditionally used millimetres, Maths complicate the issue with metres and centimetres. We know this is an area that we need to help students with so that they can use all the

divisions of a Metre confidently, converting between them and, perhaps most importantly, having a sense of the relative size of them and visualising what a particular dimension looks like.

We are also aware that QCA and HMI have highlighted the use of rulers and protractors as a national weakness at Key Stage 2 and we are doing all we can to increase pupil confidence and competence with these and other practical equipment in mathematics classrooms and workshops.

## Handling Data



Students use this four stage cycle from Key Stage 1 through to Key Stage 4 in many subject areas. Our aim is to make it interesting and relevant with an emphasis on all aspects, not just colouring in columns on graph paper.

Many subjects use graphical representation and we want to be consistent in our messages to staff and students.

## Transfer of Skills:

*“It is vital that as the skills are taught, the applications are mentioned and as the applications are taught the skills are revisited.”*

The Mathematics teacher will deliver the knowledge, skills and understanding using direct interactive teaching, predominantly in “4 part” lessons. They will make references to the applications of Mathematics in other subject areas and give contexts to many topics. Other teachers will build on this knowledge and help students to apply them in a variety of situations. Liaison between curriculum areas is vital to students being confident with this transfer of skills and the Maths teacher willingly offers support to achieve this.

The transfer of skills is something that many students find difficult. It is essential to start from the basis that students realise it is the same skill that is being used; sometimes approaches in subjects differ so much that those basic connections are not made.

The 4 part will enable the Maths Dept. to cover work for other subject areas at appropriate times. This is often in the starter activity where key skills are rehearsed and sharpened so that students gain more from the forthcoming application in the other subject.

Data Handling should be about all four stages of the cycle and combining stages from different subject areas is a powerful tool.

## Support:

Endeavour Academy educates students with Social, Emotional and Mental Health needs (SEMH), many have been absent from mainstream provision for large periods of time prior to admission, for those Year 10 students who find GCSE difficult to access, Entry Level 3 Maths will be combined with Foundation GCSE skills. The aim is to support students to achieve a certificate in this subject area, improve confidence and build on the fundamental skills which can then be used to apply to more of the GCSE content in Yr 11.

Throughout the year students will have access to Knowledge Organisers for topics studied which will act as a revision tool and support students to recap on learning, improve retention and offer exposure to GCSE style questions.

Intervention groups and after school sessions are offered to all students to assist them to practice problem solving skills and increase Mathematical fluency with homework and online learning platforms personalised to enable students to focus on areas in need of development.