

## Academy@Worden – Numeracy Policy

### **What is 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.”

*National Framework for Teaching Mathematics - DfES.*

### **Rationale:**

Academy@ Worden is committed to raising the standards of numeracy of all of its students so that they develop the ability to use numeracy skills effectively in all areas of the curriculum and the skills necessary to cope confidently with the demands of further education, employment and adult life.

Numeracy is one of the keys to learning. As teachers, we all share the responsibility of developing pupils’ numeracy skills through explicit teaching where appropriate. A range of numeracy skills should be developed across all subject areas which will support learning and raise standards across the curriculum.

**Numeracy is the responsibility of all departments and all teachers.**

There should be reference to Numeracy in departmental schemes of work and departmental development plans.

### **Aims of the Policy:**

- 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 pupils’ knowledge, skills and understanding between different subjects within the curriculum;
- **To promote the need for numeracy across the whole teaching staff so that consistency is ensured.**

### **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:**

- 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.
- Provide information to other subject teachers on appropriate expectations of students and difficulties likely to be experienced in various age and ability groups.
- 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.
- Seek opportunities to use topics and examination questions from other subjects in mathematics lessons.

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

- 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.
- Be aware of appropriate expectations of students and difficulties that might be experienced with numeracy skills.
- Provide information for mathematics teachers on the stage at which specific numeracy skills will be required for particular groups.
- Provide resources for mathematics teachers to enable them to use examples of applications of numeracy relating to other subjects in mathematics lessons.

All teachers should be committed to developing numeracy skills in all pupils in the belief that it will support their teaching and raise standards across the curriculum. We should aim to ensure that all students understand how important their levels of numeracy are. **Teachers should not say to students that they were never any good at maths. Instead, admit that they may find it difficult at times, but that they can work it out if they think about it for a while.**

### **Areas of Collaboration**

Pupils entering the school will already have varied techniques for negotiating set questions or problems, if successful and appropriate this should not be discouraged and it should be accepted that pupils are able to tackle questions with a variety of different methods. These approaches rely upon mixing skills, ideas and facts; this is done by pupils drawing on their personal preferences and the particular question.

### **Mental Arithmetic Techniques**

All departments should give every encouragement to pupils 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 more appropriate.

### **Written Calculations**

Teachers should be aware of the use of “non-standard” methods; particularly for grid multiplication and division by chunking which are methods used quite widely in primary schools (but will be disappearing with the implementation of the new National Curriculum.) The desire for pupils to progress to formal / traditional methods (generally the most efficient methods) should be made, but not at the expense of having only a method rather than a cohesive and full understanding.

### **Role & Use of Calculators**

All departments should develop a policy and consistent practice on the use of calculators. Consideration of the following three questions should help:

- Where in your subject do you expect pupils to need to use a calculator?
- Are there, and should there be, situations in your subject when you would not wish pupils to use calculators, but to use mental or pencil-and-paper methods instead?
- Are appropriate calculators available for pupil use should they not be in possession of their own?

In deciding when pupils use a calculator in lessons we should ensure that:

- pupils' first resort should be mental methods;
- pupils have sufficient understanding of the calculation to decide the most appropriate method: mental, pencil-and-paper or calculator;
- pupils are clearly instructed when and when not to use calculators;
- pupils 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;
- pupils understand the four arithmetical operations and recognise which to use (or in which order) to solve a particular problem;
- when using a calculator, pupils are aware of the processes required and are able to say whether their answer is reasonable;
- pupils can interpret the calculator display in context (e.g. 5.3 represents £5.30 in money calculations);
- we help pupils, where necessary, to use the correct order of operations, especially in multi-step calculations such as the following example:

*How much will it cost 8 adults and 72 children to visit the following attraction?*

- *adults £3.75 each*
- *children £1.80 each*

The correct calculation is  $(8 \times 3.75) + (72 \times 1.80) = 159.6$  (i.e. **£159.60**)

However, only scientific calculators have brackets and ‘ordinary’ calculators will not give the correct answer when the student keys in

$$8 \times 3.75 + 72 \times 1.80 = \quad (\text{it gives an incorrect answer of } \pounds 183.60)$$

*If using an 'ordinary' calculator, the students need to be reminded to do each multiplication part of the calculation separately and to write down those answers before adding them together. The initial writing of the calculation should always be encouraged.*

### **Vocabulary**

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

- Use of key words displayed on classroom walls;
- Using a variety of words that have the same meaning e.g. add, plus, sum;
- Encouraging pupils to be less dependent on simple words e.g. reminding them to use the word *multiply* rather than *times*;
- Discussing words that have different meanings in maths from everyday life e.g. *product* meaning *multiplication* and the *sector* of a pie chart (a sector of a circle looks like a segment of an orange, but a segment of a circle has a different meaning in maths);
- Highlighting word sources e.g. *quad* means *four* and *lateral* means *side* in the word *quadrilateral*, so that pupils can use them to help remember meanings.

### **Measures**

Technology teachers have traditionally used millimetres whereas in maths we tend to use centimetres. This is an area that we need to help pupils 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.

Historically imperial units are often used, so it is pertinent to ensure that pupils are aware of the relative size of these in comparison to today's metric measures.

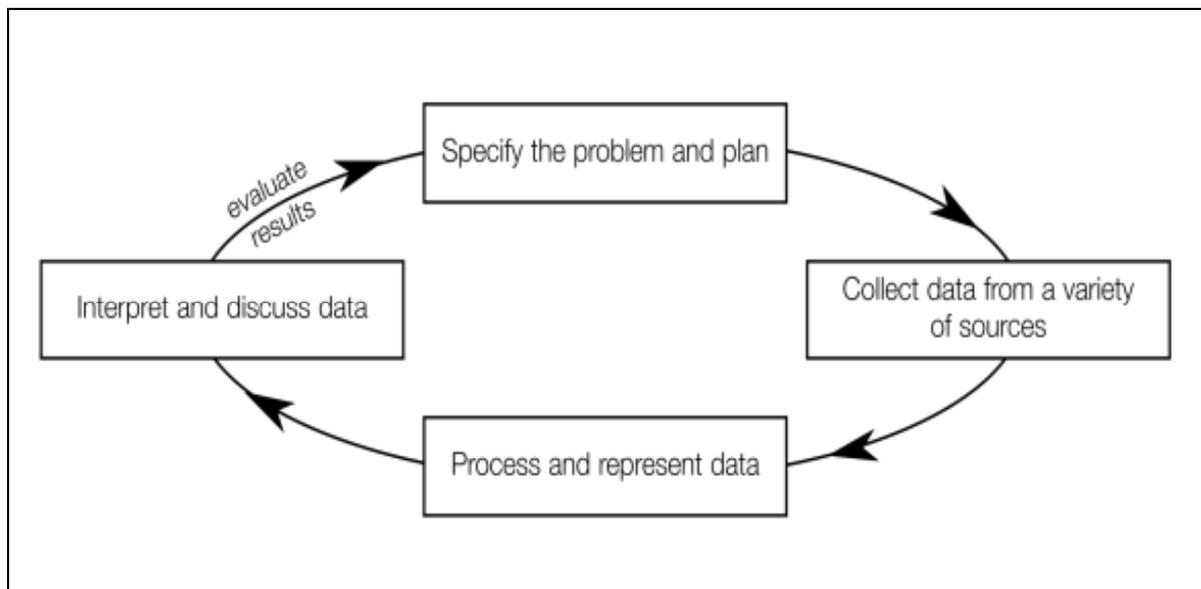
QCA and HMI have highlighted the use of rulers and protractors as a national weakness at Key Stage 2 and we must increase pupil confidence and competence with these and other practical equipment in mathematics classrooms, science labs and technology workshops.

### **Handling Data**

Pupils use the four-stage cycle in many subject areas (see diagram below).

Our aim must be to make handling data both relevant and interesting with an emphasis on all aspects of the cycle. There is a tendency to spend more time on simply displaying the data graphically (especially true when using ICT to produce a complicated 3-D pie chart) rather than analysing what the data is saying.

The Four-stage Cycle:



It is common practice for pupils to produce a 'graph' to illustrate data, but there are many different types of these, some of which will be more appropriate than others. It is therefore an ideal opportunity for the mathematics department to be consulted in these areas so as to ensure that the most suitable type of graph is produced. This is particularly important when considering discrete and/or continuous data.

**The Environment**

A numeracy rich environment should be created in classrooms and other display areas. The environment will celebrate student's work; generate interest and enthusiasm; and support the development of numeracy skills.

**Monitoring and Evaluation**

Through lesson observations, learning walks and work scrutiny.

**Success Criteria**

Improved numeracy skills will lead to enhanced learning and progress with increased levels of students' self confidence in numeracy.