



the *King's* school

specialising in maths and computing

# Numeracy Across the Curriculum Policy

### **1 Policy Statement**

At The King's School, we believe numeracy is a key skill in students' learning and all students are entitled to quality experiences in this area. The policy is required because we recognise that the teaching of numeracy is the responsibility of all staff and the school's approaches should be as consistent as possible across the curriculum.

Numeracy is a proficiency that involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts. Numeracy also demands practical understanding of the ways in which information is gathered by counting and measuring, and is presented in graphs, diagrams, charts and tables.

Mathematical skills can be consolidated and enhanced when students have opportunities to apply and develop them across the curriculum. Poor numeracy skills, in particular, hold back students' progress and can lower their self-esteem. The school has an increasing number of students with a mathematical level of 3 or below. Tackling numeracy and literacy issues is key to success for our lower achieving students and is a priority in the school development plan.

### **2 Purpose**

The purpose of this policy is to enable each student to further develop mathematical skills through their application in all areas of the curriculum in order to promote better learning and to raise standards. The policy aims to raise awareness of numeracy in all aspects of the curriculum and with all staff.

### **3 Scope**

This Policy will be used by all staff and will apply to all students regardless of age and ability. Student progress will be monitored from transition across all key stages and appropriately targeted strategies for intervention will be put in place.

The school has several intervention programmes to help raise numeracy levels of those students who enter the school at level 3 or below. These are:

- Numeracy Club for Years 7, 8 and 9, this takes place twice a week during registration for 20 minutes. Students working at level 3 are invited by letter to attend these sessions run by the Maths Department's HTLA.
- SEN offer SLD withdrawal in maths for students who are working below level 3 i.e. at B level.
- One to One Tuition is offered to students working at level 3. This is delivered by an outside agency and the Deputy Headteacher has responsibility for recruiting and managing the budget for this project. The Assistant Subject Team Leader for Maths identifies students through the department record of student attainment.

## **4** Responsibility

The Numeracy Co-ordinator is responsible for:

- Keeping the policy updated;
- Maintaining an up to date audit of numeracy taught across the curriculum;
- Monitoring of lessons to ensure consistency of the numeracy delivered;
- Working with departments on a numeracy theme, with an aim to emphasise and improve awareness of cross curricular links;
- Overseeing numeracy intervention that takes place and working with staff to identify students who require targeted support;
- Collating records of attendance and topics covered in all intervention sessions;
- Measuring the impact of intervention through testing of students at department level and school tracker and grade collection data.

Subject Team Leaders are responsible for developing numeracy within their own curriculum and should have a linked Numeracy Policy which reflects this. The Numeracy Co-ordinator will offer help and support where required to help produce these. Each department should identify the contribution it makes towards numeracy and other mathematical skills so that students become confident at tackling mathematics in any context.

Staff - It is the staff's responsibility to ensure that materials presented to students will match their capability both in subject content and in numerical demands. They will liaise with the Special Needs and Mathematics departments when appropriate in order to support their teaching of numeracy. When numeracy is used within lessons staff should refer to specific guidance outlined in the policy.

## **5** Publicity

A statement regarding the Numeracy Across the Curriculum Policy will be made on all publicity materials, all new staff and students recruited to the school will be made aware of it. The policy will be posted on the Shared (G) drive of the School's IT network and on the School website.

## GUIDANCE

This document should provide information and guidelines to help produce consistency across the curriculum - it is not intended to be a prescription for teaching although some advice is given.

All teachers should consider students' ability to cope with the numerical demands of everyday life and provide opportunities for students to:

- Handle number and measurement competently, mentally, orally and in writing;
- Use calculators accurately and appropriately;
- Interpret and use numerical and statistical data represented in a variety of forms.

### Approaches

- It is recognised that not all students in a teaching group will have the same numerical skills and where unsure of an appropriate 'numerical level' teachers will consult with the Mathematics Department.
- All teachers will discourage students from writing down answers only and encourage students to show their numerical working out within the main body of their work.
- All teachers will encourage the use of estimation particularly for checking work.
- All teachers will encourage students to write mathematically correct statements.
- It is recognised that there is never only one correct method and students will be encouraged to develop their own correct methods where appropriate rather than be taught 'set' ways.
- Wherever possible students will be allowed and encouraged to 'vocalise' their maths - a necessary step towards full understanding for many students.
- All students should be helped to understand the methods they are using or being taught - students gain more and are likely to remember much more easily if they understand rather than are merely repeating by rote.

### Calculators:



In order to improve numeracy skills, it is essential that students should be encouraged to use non-calculator methods whenever possible. However departments should ensure students have access to calculators when they are necessary.

It is recognised that where calculators are to be used their correct use may have to be taught.

### Methods and Presentation:

Where a student is gaining success with a particular method it is important that s/he is not confused by being given another method. This does not disallow the possibility of introducing alternatives in order to improve understanding or as part of a lesson deliberately designed to investigate alternative methods, provided students can manage this without confusion.

### Language:

When referring to decimals say "three point one four" rather than "three point fourteen".  
Read numbers out in full, so say three thousand four hundred rather than three, four, zero, zero.  
*Except for very long numbers.*

It is important to use the correct mathematical term for the type of average being used, ie. mean, median or mode.

Mean	Total of values of sample $\div$ sample size. [The term average is commonly used when referring to the mean]
Median	Middle value of sample when sample values are arranged in order size.
Mode	Sample values which occur most frequently.

Checking:

Encourage students to check divisions by multiplication and subtractions by adding.

Rough Conversions between Metric and Imperial:

In the Maths Department we teach the following conversions:

1 inch $\approx$ 2.5 cm	1 yard $\approx$ 1 m	1 kg $\approx$ 2.2 lbs
2 pints $\approx$ 1 litre	1 mile $\approx$ 1.6 km	1 oz $\approx$ 25 g

Students should be expected to record the units they are using when answering a question.

Standard Form:

Students need to be aware of how their calculators express standard form and what it means.

Eg. on some calculators  $5 \div 200 = 2.5^{-2}$

It should be noted that this should be recorded as  $2.5 \times 10^{-2}$  and that it is equivalent to 0.025

Multiples of ten:

When multiplying by ten do not teach the 'rule' add a nought or move the decimal point along one but rather explain that the numbers move one place to the left relative to the decimal place.

So  $3.64 \times 10 = 36.4$

Time:

Students should never record 3 hrs and 30 mins as 3.30hrs but as 3.5 hrs.

[When working with time it is possible to use the degrees/mins/secs key on many calculators.]

Equations:

The terms "cross-multiply" and "swap sides - swap signs" can lead to misunderstandings, as part of any explanation of how to solve equations and so should be avoided.

To teach solution of linear equations we use the 'balancing method' or a flow diagram

To solve:  $3x - 7 = 5$

<u>Balance Method:</u>	$3x - 7 = 5$	(add 7 to both sides)
	$3x - 7 + 7 = 5 + 7$	
	$3x = 12$	(divide both sides by 3)
	$3x \div 3 = 12 \div 3$	
	<u><math>x = 4</math></u>	

Flow Chart Method:

START:  $x \rightarrow \boxed{\times 3} \rightarrow \boxed{-7} \rightarrow 3x - 7$  (you now UNDO)  
END:  $4 \leftarrow \boxed{\div 3} \leftarrow \boxed{+7} \leftarrow 5$   
 $x = 4$

## GUIDELINES FOR CONSTRUCTING/USING GRAPHS AND CHARTS



Students should be encouraged to:

- Use a sharp pencil;
- Label both axes and give a title;
- Use independent variable on x-axis, and dependant variable on the y-axis, eg: if graphing temperature of a cooling liquid, time should go on the x-axis and temperature on the y-axis. [The temperature of the liquid is dependant on the time of the reading];
- Label lines not spaces, unless a bar-chart with discrete data;
- Use equally spaced intervals;
- Use convenient scales;
- Mark points by a small cross not a dot;
- Draw graphs on squared or graph paper;
- To draw graphs of a sensible size (they tend to make them too small).

Students should be exposed to Bar Charts, Pie Charts, Pictograms, Line graphs and Cumulative frequency curves. Histograms are only tackled by higher level students.

Students need to be taught when each type of graph is appropriate. (This is very important as students will generally produce the type of graph they last met without much thought to appropriateness).

### Bar-charts

The bars should be of equal width and equally spaced;  
The bars do not have to touch for discrete data;  
Frequency should be on the y (vertical) axis.

### Discrete data

Data is described as discrete if specific values only can be used, eg. shoe size is discrete as sizes such as 4.8 and 5.77 cannot exist.

### Continuous data

Data is described as continuous if all values can exist, eg. height and weight are continuous data as potentially any value could be measured.

### Pie Charts

Sectors should be labelled (eg. Car, Blue....) or there should be a key.

Do not be surprised if the total of all the angles is  $360^\circ$  plus or minus one or two degrees. This will almost certainly be due to the rounding that may be necessary. In these cases either add or take the one or two degrees from the largest angle.

### Histograms

Do not use the term Histogram unless the bar widths are unequal and frequency density is plotted along the y axis. This is only taught to those in the top set in Years 10 and 11. Students need to appreciate the connection between the area and the frequency.

### Scaling

If axes do not start from zero, a break represented by a zig-zag line should be shown on the axis.