Dame Alice Owen's School
The Dame Alice Owen Foundation – 1613

WHOLE SCHOOL NUMERACY POLICY

Agreed by the Governing Body Curriculum Committee	October 2020
To be reviewed	Autumn 2022
(reviewed every two years)	

To be monitored by the SLT, Liam Lawlor (Maths Department) and the Governing Body Curriculum Committee

---

Introduction

Numeracy is a proficiency that should be developed in all curriculum areas, although mainly in mathematics. It is more than the ability to do basic arithmetic. It involves instilling confidence and competence with numbers and measures. It requires understanding of the number system, a repertoire of mathematical techniques and an aptitude to solve quantitative or spatial problems in a range of contexts. Numeracy also demands an understanding of data collection and its presentation in graphs, diagrams, charts and tables.

At Dame Alice Owen's School it is appreciated that the development of numeracy skills is an entitlement for all students and is the responsibility of the whole school community, not just the mathematics department.

The National Numeracy Strategy is already being implemented in Key-Stage 3 (KS3) mathematics and the National Curriculum encompasses all mathematics up to A-Level. The renewed KS3 Framework builds on this original 2001 Framework for teaching mathematics. Its aim is to help students to develop skills in analysis, using mathematical procedures and reasoning; be able to interpret and evaluate; and represent mathematical situations. The new Framework is designed to increase students' access to excellent teaching and engaging, purposeful learning that will enable them to make good progress through Key Stages 3, 4 and 5.

This agreed policy should be evident across the whole curriculum, building upon existing good practice and serving the needs of each individual student.

Aims of the Policy

- To ensure that students receive positive messages about Numeracy, wherever used in the curriculum, and to secure high standards across the school.
- To recognise that teachers in all subject areas have a contribution to make in encouraging the development of numeracy skills.
- To enable students to appreciate the relevance and importance of numeracy in helping themselves explain and understand the world.
- To ensure a consistency of method whenever teachers and students use numeracy in school.

Objectives

- To realise the full potential of all students, including the Social and Emotional Aspects of Learning (SEAL).
- To encourage all subject areas to contribute to raising numeracy levels.
- To assist all subject areas whenever their schemes of work have a numeracy component.
- To agree a common, whole school approach to all aspects of numeracy (including calculations, graphs, measurement and units) [see appendices]

Management

- The mathematics department acknowledges that as a team, it will play a key role in the implementation of this policy, with a readiness and willingness to advise and assist colleagues from other departments whenever requested.
- All staff will need to be aware of this policy, including the appendices, and of the specific numeracy content opportunities of their own subject Schemes of Work

Monitoring

Students should have access to numeracy which, with literacy and ICT, must be recognised as basic communication skills for all.

All those in management positions have a responsibility to ensure the policy is properly implemented in their own subject areas. This policy should be borne in mind whenever there is any lesson observation (N.Q.T., Performance Management or otherwise) and should be an indicator used by S.L.T. during Homework Reviews and the regular cycle of Department Reviews.

This policy will need periodic review and will be achieved by regular meetings principally, but not exclusively, involving members of those departments that are frequent users of numeracy. The recommendations of these meetings will then be presented to the Curriculum Committee.

Liam Lawlor
October 2020

Appendix 1 – Units

			Also, but less common	
Length	millimetre centimetre metre kilometre	mm cm m km	inch foot yard *mile*	in ft yd m
Area	square centimetre square metre square kilometre or kilometre squared	cm^2 m^2 km^2		
Volume	millilitre centimetre cubed centilitre litre	ml cm^3 cl l		
Mass (Weight)	milligram gram kilogram tonne	mg g kg *t or tonne?*	pound ton	lb
Velocity (Speed)	miles per hour kilometres per hour metres per sec metres per min	m.p.h. km/h m/s (and mm/s and cm/s) m/min		*A-Level* ms^{-1}
Flow	metres cubed per sec	m^3/s	(Geog: cumecs)	
Acceleration	typically	m/s^2		ms^{-2}
Density Popn. Density Light Density	KS3 GCSE A-Level people per km^2	g/cm^3 kg/m^3 mol/dm^3 lux	 (not people/km^2)	
Force	newton	N		
Work or Energy	joules	J		
Power	watt kilowatt	W or J/s kW		
Pressure	newton per metres squared pascal millibar	N/m^2 or N/cm^2 Pa mb		*A-Level* *Atm*
Time	hour minute second	h min s		

Table of common SI prefixes used with metric measures

Prefix	Symbol	Value
peta-	P	10^{15} 1 000 000 000 000 000
tera-	T	10^{12} 1 000 000 000 000
giga-	G	10^{9} 1 000 000 000
mega-	M	10^{6} 1 000 000
kilo-	k	10^{3} 1000
hecto-	h	10^{2} 100
deka-	da	10 10
deci-	d	10^{-1} 0.1
centi-	c	10^{-2} 0.01
milli-	m	10^{-3} 0.001
micro-	μ	10^{-6} 0.000 001
nano-	n	10^{-9} 0.000 000 001
pico-	p	10^{-12} 0.000 000 000 001

Notes

- Commas should no longer be used for place value in numbers.
  e.g.

eight hundred	800
eight thousand	8000
eighty thousand	80 000
eight hundred thousand	800 000
eight million	8 000 000

- Numerical answers must be written to a sensible degree of accuracy, bearing in mind the accuracy of the input figures. A full calculator display will rarely be appropriate.
- Correct foreign conventions for numbers to be used in language lesson e.g. commas for decimals in Germany.
- Estimating of answers is to be encouraged before calculation to ensure that answers given are sensible e.g. avoiding an over reliance on calculators. ICT use dummy data to check the processes created.
- The rounding convention of 5 and above is to be used e.g. 23.5 is 24 to 0 decimal places. The exception is PE which uses a different system for measurement.

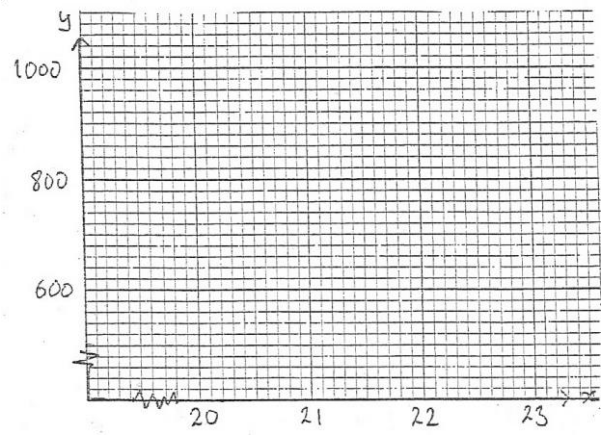
Appendix 2 - Graphs

All graphs should have a title.

Both axes should be labelled with name and units.

Scales should be appropriate. The selection of appropriate scales for the axes is a skill and should be developed in all subject areas. It should not be assumed that this technique will just occur to students. All subject areas should give their classes guidance in how best to select scales, as in some subjects inappropriate scales are marked down.

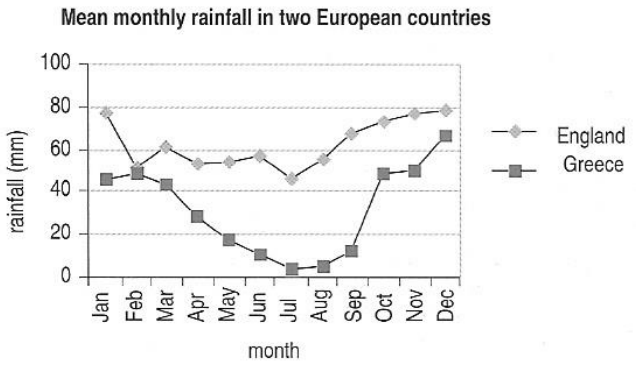
To show that the two variables (x and y) are proportional it is often necessary to have both axes starting from zero. Otherwise however a squiggle can be used (see below).



Interpreting graphs is a high level thinking skill and needs to be developed in all subject areas.

Line graphs

The Numeracy Framework Defines a 'Line Graph' for example as:-

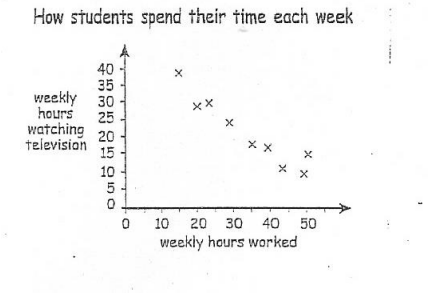


With the points joined in order to compare the trends over time (or whatever)

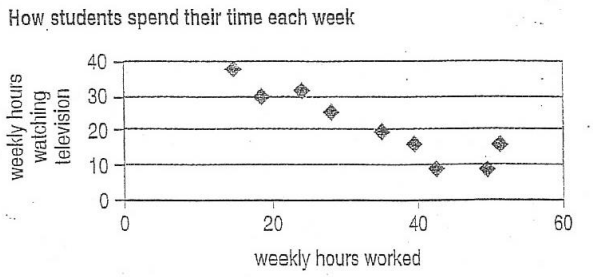
Scatter Graph

Use a scatter graph for bivariate data (when there are two variables)

plotted by hand



using ICT



Scatter graphs lead into drawing 'lines of best fit'.

[If the two variables are directly proportional the line of best fit will pass through the origin (0,0). In theory, lines of best fit should pass through $(\bar{x}, \bar{y})$, that is, the mean of both variables. However it should be borne in mind that calculating these values can often extend the time spent drawing the graph with little real benefit and may therefore be done by eye.] If curves of best fit are used, emphasis should be made that the relationship is non-linear.

Bar Graphs

For discrete data bars should be separate i.e. not touching. Continuous data (anything measured) graphs bars may touch.

Pie Charts

Pie charts are mainly suitable for categorical data. The information to be displayed may be in percentage form or may be the raw data. Do not mark the sizes of the angles on pie charts.

I.C.T.

All departments should be aware that it is important that when graphs are to be drawn using Software Packages students should select the same (or similar) graphs as they would use if drawing them by hand. Colourful and unusual graphs often do not display data appropriately or clearly, but are selected merely because they look different from graphs students already know and understand.

Types of Data

At present it seems that the Science Department is the first to encounter

- Discrete and continuous data
- Dependent and independent variables
- Finding the actual equation of the 'line of best fit'

All departments should explain these terms when appropriate to their own Schemes of Work.