



ASHLAWN SCHOOL
‘A High Performing Specialist Academy’

Numeracy Policy

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| Policy & Procedure Number | AP030 |
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Ashlawn School Numeracy

Overview

The development of numeracy skills is a whole-school responsibility. All teachers should demonstrate an understanding of and take responsibility for promoting high standards of numeracy, whatever the teacher's specialist subject.

What do we mean by Numeracy?

Numeracy is the life skills associated with mathematics. It includes the ability and the inclination to solve numerical problems relating to everyday life and a familiarity with the ways of interpreting data relevant to daily life.

Why numeracy?

Being numerate helps us to function responsibly in everyday life and contribute effectively to society. It increases our opportunities within the world of work and establishes foundations that can be built upon through lifelong learning. Numeracy is not only a subset of mathematics; it is also a life skill which permeates and supports all areas of learning, allowing young people access to the wider curriculum.

Aims:

Given the above, the long-term aims of the whole-school numeracy policy are to enable students:

- To recognise and develop transferrable numeracy skills
- To become confident in solving numerical problems
- To be effective at interpreting data presented in tables graphs and charts
- To hold numeracy skills for life that will enable all students to be confident in handling numbers that is appropriate for their circumstances

Whole-School Approach – The Bigger Picture What Can Numerate Students Do?

It is important that all students are given an opportunity to develop their numeracy skills for life.

With this in mind, numerate students must:

- Know multiplication facts up to 10x10 and addition and subtraction facts up to 20
- Can make sense of numbers and interpret them appropriately
- Can calculate accurately using a range of mental, written and calculator strategies as appropriate
- Can check answers for reasonableness by approximating to “easy numbers” and then estimating
- Are able to explain their methods of calculation
- Can interpret data presented in a variety of forms, and recognise misleading representations.
- Can suggest suitable units for measuring and make sensible estimates of common measurements

How Can You Help?

All Teachers:

- Can flag up numeracy when it used in lessons using appropriate language to allow students to recognise its importance as a life skill with relevance across all subject areas
- Can help in consolidating the skills outlined above and in the accompanying “Whole School Numeracy Guidelines” when relevant (Appendix 1)
- Can help us to promote a positive attitude towards numeracy, never say “I’m no good at Maths”, or similar
- Can display the numeracy skills words in your classroom and refer to it when appropriate (see Appendix 2)
- Pass concerns to numeracy coordinator or member of the maths department

Ensuring Consistency

Appendix 1 contains more detailed information on how to approach common numeracy problems and common mathematical topics which are common across many subject areas. It is important to be aware of the methods and language that students may be used to avoid confusion.

Summary of approach

Students should be encouraged to develop their own mental and pencil and paper methods but always use the correct mathematical terminology

They should estimate answers where possible using known facts and compare the estimates to the answers

They must often be careful of the units involved

When drawing charts the students should label them fully. Understanding the meaning of the charts is as important as being able to draw them

Enhancing Numeracy

In addition to whole-school measures already listed and those already embedded within the Maths department and other department schemes of learning, the following are designed to enhance numeracy:

- Additional subject-specific measures identified in "Numeracy Co-Ordinator" and "Departmental Numeracy Contact" liaison
- One-to-one tuition programme for targeted Year 7,8 and 9 students
- LDD numeracy intervention
- Pastoral time activities that develop core numeracy 'life skills'
- Incorporation of numeracy as an important skill recognised by the Ashlawn School Teaching Standards

In summary, it is possible to broadly identify a 3-pronged approach to numeracy:

- The Whole-school approach-department, pastoral and cross-department measures
- The Maths Department approach
- The Extra-curricular and intervention approach

Appendix 1 - Whole School Numeracy Guidelines

Another aim of this document is to ensure a consistent approach to the teaching of aspects of numeracy across departments within the school.

Summary

Students should be encouraged to develop their own mental and pencil and paper methods but always use the correct mathematical terminology

They should **estimate answers** where possible using known facts and compare the estimates to the answers

They must often be careful of the units involved

When drawing charts the students should label them fully. Understanding the meaning of the charts is as important as being able to draw them

Pencil and Paper – Arithmetic Methods

Students should be encouraged to use their own methods if possible and to check that their answers look about right. They should be looking for shortcuts. For example to multiply by 20, double the number then multiply by 10 or adding 38 is the same as adding 40 and then subtracting 2.

When multiplying by 10 or 100 it is important to stress that adding zeros doesn't always work (e.g. $4.5 \times 10 = 45$). The same principle is true for dividing by 10, 100 etc.

Staff should use the words multiplication, division, addition and subtraction (i.e. not use share by etc).

Other words that might be useful are:

- **Product-** The product of 4 and 5 is 20
- **Difference-** The difference between 7 and 3 is 4
- **Sum-** The sum of 4 and 5 is 9

Long multiplication and division will be difficult for many/most K.S.3. students and lower band K.S.4. students.

There are other methods for long multiplication that we teach which use grids. Many students may prefer to use these methods if reminded about them.

Using Calculators

We do not use calculators for basic calculations.

They are used for checking answers and to speed up calculations where the focus is not on pencil and paper methods.

Estimating Answers

When estimating, students should use facts that they know to predict facts that they don't know, e.g. 50% of something is half of it so 60% will be over half.

When estimating calculations students should round to the nearest easy number e.g. 300, 5000 etc.

Calculations using Metric and Imperial Units

Students do not need to learn exact conversions, but should be aware of different units of measure and may need to convert if given conversion.

Percentages

All students are required to be able to work out mentally at least simple percentages of numbers by the end of KS3.

For all students we use 10% and 50% as starting points. For example 35% of 240:- 10% of 240 = 24, therefore 5% of 240 = 12, so 35% of 240 = 24+24+24+12=84.

Upper band students will cover more complicated percentages by using a calculator, either by $\div 100$ or by multiplying by the percentage as a decimal (e.g. 56% = 0.56).

We encourage the students to estimate the answers first and check their answers against this.

When increasing or decreasing against a percentage there are two methods:-

- Start with 100% add or subtract the % as appropriate and then turn the resultant percentage into a decimal and then multiply by the amount.

E.g. Increase £56 by 12%, $100\% + 12\% = 112\% = 1.12$, $1.12 \times 56 = £62.72$
Decrease £78 by 8%, $100\% - 8\% = 92\% = 0.92$, $0.92 \times 78 = £71.76$

- Change the percentage into a decimal, multiply by the amount and then add or subtract as appropriate

E.g. Increase £35 by 11%, 11% is 0.11 as a decimal, $0.11 \times 35 = £3.85$,
 $£3.85 + £35 = £38.85$

Algebra

- All years cover substituting numbers into algebraic formulae and use expressions in algebra, although only upper band KS4 will cover the manipulation of algebraic expressions in depth.
- Encourage them to set out the calculation fully on paper, step by step, and remind them about the rules of **BIDMAS**. (**B**rackets, **I**ndices, **D**ivision, **M**ultiply, **A**dd & **S**ubtract)

e.g. $16 \div 2 \times (3+7) - 3 \rightarrow 16 \div 2 \times 10 - 3 \rightarrow 8 \times 10 - 3 \rightarrow 80 - 3 \rightarrow 77$

Note: Scientific calculators do this automatically, normal 4 function calculators do not! ($2 + 3 \times 4 = 14$ not 20)

Pie Charts

- Students will use a pie chart scale or a protractor to draw pie charts.
- Students should always show the working out when calculating angles.
- They should work out what number of degrees one item is worth, and then multiply all data by this.

Scatter Diagrams

- We use the word **correlation** to describe the patterns in scatter diagrams.
- We cover **negative**, **positive** and **No** correlation and students will also be expected to know the difference between strong and weak correlation.
- In the cases where a positive or negative correlation is seen **a line of best fit may be drawn, this is a straight line.**

As with all graphs, points are marked with a neat cross (x)

Bar Charts

- Bar charts should only be used for displaying **discrete data**
- **There should be gaps between the bars.** Bars should be the same width.
- When drawing **bar charts** the axes should be clearly labelled and there should be a clear title

Frequency Diagrams

- When **continuous data** is used Frequency diagrams should be used
- There should be no spaces between the bars, labelling of the axis should be on the junction of the bars
- **Histograms** are only taught to KS4 students.

- They are used for unequal intervals and the area of each block is used for comparison

Line Graphs

Should only be used for displaying continuous data, e.g. temperature, or illustrating trends over time.

- Common problems when drawing graphs is that the students label the gaps on the graph paper instead of the lines and the scales on the axes are not constant.
- A short zig-zag on a scale on the scale at the origin indicates that it does not start at 0
- Common scales used are 0.1, 0.2, 1, 2, 5 and 10 for each unit on an axis.
- Check that all gaps on the scales are of an equal width

Points on the graph are always marked with a neat (x)

Averages

Use of the word 'average' by staff is to be discouraged and rather "which type of average?" should be used. If unsure, staff should replace the word average with "Mean".

In Maths there are three measures of central tendency (averages)

- **Mean** – Add the numbers up and divide by how many numbers there are
- **Median**- The middle item in an ordered set of numbers
- **Mode** – The most frequent number or item
- In addition staff are encouraged to use the term **RANGE** which is the difference between the maximum and minimum values in a set of data, students should show their working out when arriving at this answer

Understanding **why mean, medium and mode** give different answers and when each is used is a key point

- **Mean** is used when the data is numerical and the data is not too spread out
- **Median** is used when the data is fairly closely grouped but there are a few numbers that vary in size greatly from the majority of numbers

- **Mode** can be used when the data is non numeric as well as numeric.

Appendix 2–Numeracy Keywords

| Skill | Indicative Learning Behaviour & Assessment Criteria Language |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Numeracy | Calculate, Investigate, Interpret, Reason, Generalise, Convert, Think Logically, Estimate & Approximate, Work Out, Analyse Data, Measure, Rate, Equate, Average (mean, median or mode), Solve |

This policy is to be read in conjunction with the Safeguarding Policy