Numeracy Policy

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<p align="center">**A Shared Approach to Numeracy**</p>

The purpose of this policy is to:

- improve, develop and sustain standards in numeracy across the curriculum through mental, written and verbal communication skills;
- ensure consistency of practice across the school; and
- assist the transfer of pupils' knowledge, skills and understanding between subjects.

Raising Standards

Along with literacy, numeracy needs to be at the forefront of every student's learning and all teachers are teachers of numeracy. The messages sent around the school need to be positive, consistent and in line with methods derived from the Mathematics Faculty and through liaison with other middle leaders.

We would consider a numerate student to be able to:
- have a sense of size of a number and understanding the place value of each digit (hundreds, tens, units etc.);
- recall number and measurement facts quickly;
- are able to apply mathematical skills and knowledge to real-life situations;
- have a range of mental and written calculation strategies for the four operations, building on number lines and number bonds, leading to written calculations ;
- make sense of number problems and recognise which operation is needed;
- know when their answers are sensible;
- be able to explain their methods;
- suggest suitable units for measuring;
- explain and make predictions from data in a graph, chart or table; and
- solve number problems involving time.

For effective numeracy skills, we explicitly teach the students to develop mental strategies and enable them to successfully break down questions; write legibly putting mental strategies onto paper; have a growing mathematics vocabulary to aid with more literacy based questions; ensure all students can access the principle skills of drawing scales, graphs and charts; apply the skills of mental/written/graph work to other subjects and develop in confidence and self-expression.

We build in frequent opportunities for students to demonstrate higher level thinking in numeracy based subjects and positively encourage cross curricular thought.

Consistent Practice

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. liaise with other teachers and 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, these areas have been identified as scales on diagrams and place value (the size of numbers);
3. provide information for mathematics teachers on the stage at which specific numeracy skills will be required for particular groups;
4. provide resources or schemes of work for mathematics teachers to enable them to highlight areas where numeracy can be applied within other subjects.

Areas of collaboration

Mental Arithmetic Techniques

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 departments 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

Emphasis should be made of 'non-standard' methods, particularly for grid multiplication and division by 'bus stop'. Whilst the desire for students to progress to formal algorithms and the most efficient methods is acknowledged, it must not be at the expense of having only a method and not a cohesive and full understanding of what is required.

Vocabulary

The following are all important aspects of helping students with the technical vocabulary of mathematics:
- using a variety of words that have the same meaning;
- encouraging students to be less dependent on simple words, e.g. exposing them to the word *multiply* as a replacement for *times;*
- using clear vocabulary for different operations e.g. -5 as negative five and the operation is subtraction (removing the word minus as an ambiguous word);
- discussion about words that have different meanings in mathematics from everyday life e.g. take away, volume, product etc.; and
- 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. The use of vocabulary should be included in success criteria and when students reflect upon their lesson.

Methods

To be consistent throughout the school, Longhill High School will adopt the following methods for the four operations.

Addition	Column method (lining up the place value)
Subtraction	Column method (lining up the place value and borrowing)
Multiplication	Long multiplication or the grid method
Division	Short division (bus stop method)

789 + 642 becomes

```
    7  8  9
 +  6  4  2
 _____
 1  4  3  1
    1  1
```

Answer: 1431

874 – 523 becomes

```
    8  7  4
 –  5  2  3
 _____
    3  5  1
```

Answer: 351

24 × 16 becomes

```
       2
    2  4
 ×  1  6
 _____
 2  4  0
 1  4  4
 _____
 3  8  4
```

Answer: 384

98 ÷ 7 becomes

```
       1  4
     _____
 7 | 9  ²8
```

Answer: 14

These are in-line with the primary school methods to help transition from Year 6. Significant time is dedicated to teaching and securing fluency in these methods in the first term of Year 7.

Cross-curricular 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.

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 should consult with the Mathematics Department. Below are the shared approaches:

- all teachers should 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 should encourage the use of estimation particularly for checking work;
- all teachers should encourage students to write mathematically correct statements;
- it is recognised that there is never only one correct method and students should be encouraged to develop their own correct methods, where appropriate, rather than be taught 'set' ways; and
- 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.

General Advice

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.

Working out
In all arithmetic, the importance of place value and neat column keeping should be stressed. In a line of workings an 'equals' sign should only appear once.
This is poor practice: £3.50 x 0.85 = 2.975 + 3.50 = 6.475 = £6.48
This is good practice: £3.50 x 0.85 = 2.975
$$2.98 + 3.50 = £6.48$$

Language
Teachers must:
- when referring to decimals, you should 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; and
- it is important to use the correct mathematical term for the type of average being used, i.e. mean, median or mode.

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

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