Eden Park High School

Cross Curricular Provision

Mathematics

Literacy

Functional questions are part of the curriculum and will more often than not include written examples which students have to extract the Mathematical parts from. In our textbooks these written examples will feature on every page and every lesson should have slides for classroom discussion with written examples on in order to familiarise pupils with these.

These types of questions should be titled with “STEM”, “reasoning” and “problem solving” as these are the 3 main categories that written questions come from.

Key word lists for each topic are available for all students. They are encouraged to write down keywords for a topic at he beginning of each lesson. Misspelling of a key word is not a cause for a Maths student to be marked down at any stage of the GCSE (in official mark schemes as long as the word is similar to the correct one It is accepted). However we will still point out spelling mistakes in our marking and encourage them to practise the word during DIT.

In order for teachers to help with the technical vocabulary of Mathematics; they should encourage 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 exposing them to the word multiply as a replacement for times. Discussion about words that have different meanings.

Numeracy

Whilst numeracy and Mathematics are often seen as one and the same thing it is our philosophy that Maths is the art of problem solving and reasoning and that numeracy, a fluency with numbers is a skill required to access this rather than the whole part of it.

In certain lessons have focus on mental arithmetic, the understanding of basic number and measure skills. As a school we should encourage pupils to use mental arithmetic as a first resort. These will be especially important for pupils who have left KS2 without secure numeracy skills.

Use of calculators allows freedom from repetitive difficult calculations and hence a freedom from practising numeracy skills. Pupils should have open access to calculators (preferably their own) but should be encouraged to use them sensibly e.g not for working out simple calculations in order to keep their numeracy skills sharp.

Personal Development

SMSC (Spiritual, Moral, Social and Cultural)

Spiritual- Encouraging pupils to think deeply about how the world around them works will help their spiritual development.

In the data handling units looking at data and encourage students to make conclusions about the world they live in. Looking at sequences and patterns encourage students to look at where these occur in the

natural world. Looking at the nature of measurements and dimensions opens up a conversation about our reality and what it means to exist in 3 dimensions and how we define the blocks that make up our universe.

Moral- Moral issues are most likely to arise in the data handling side of things. We discuss the meaning of averages and how we define normal from them. It is important to understand the difference between average and treatment of the individual, this is a common misconception and issue in society. for instance it could be said by analysing data the mean running speed of girl lower than that of a boy. This is absolutely true but it does not mean that all girls are incapable of running well or that girls who run faster than boys don't exist.

We look at how data can be misused to make a false point, either by using the wrong type of average or by using badly scaled graphs. For instance, you can make one thing look twice as good as another if you start the graph at a high enough scale.

Finally, in data collection we discuss the importance of avoiding misleading or biased questions, or inappropriate questions which likely lead to false information.

Social- We like to give opportunity for pupils to tackle problems in groups or pairs. We have a collection of problems to be shared in the department that are designed to be solved as a group but also encourage tackling certain classroom examples collectively as well.

Cultural- The beauty of Mathematics is that it is a universal language, the basic laws of calculation are the same in every country. In Maths we teach the laws of BIDMAS and explain that the order being kept the same allows all countries to produces results which match.

In learning written methods for multiplication rules, we look at the various ways strategies countries have used in the past, there is a Chinese, Russian and even Egyptian method that can be taught.

An individual skill that can be important is using proportion reasoning to calculate exchange rates and it brings about a discussion on why different countries have different value attached to their currency.

British Values

Democracy- In Mathematics students have respect for democracy and the right for all fellow students to have their voices heard. In this subject there are very often multiple ways for students to solve a problem, we encourage students to pick the method that suits them and don't try to force them down one line of thinking. It is also considered to be positive if a student feels they have found a method of doing things that the teacher has not thought of and to share it with the rest of the class.

Rule of law- Whilst Mathematics is not itself associated with societal laws it is itself a set of laws. All Mathematics is based in a series of rules which are based on a series of rules right to the core meaning of the number "1". Ignoring a law or applying it slightly differently causes the whole thing to break down.

Individual liberty- In Mathematics lessons students are able to have a freedom of expression whilst respecting others during contributions to class discussions. Students are encouraged as much as possible to develop our independent learning skills to help us take control of our own learning. All students are given opportunities to challenge themselves and make progress with their learning we try to have 2/3 different tasks for students to choose from, sometimes employing a RAG system or having a Main and challenge/stretch task. In appropriate sets the Red task is often a support task to help students begin to scaffold their own learning.

Tolerance- While tackling tolerance isn't a specific aim of any of the curriculum content there are subtle ways we can embed it. If one of the best ways to teach tolerance of other cultures is immersion then this is the main way teach this. Characters and names used in Maths examples are ethnically balanced, problems often discuss people trying to solve an issue with people of all backgrounds, these problems should not insinuate one party is less able or incapable of matching the other.

A key example in year 7 for instance be writing a table for press ups completed by named characters of both genders, the boys do not exclusively beat the girls in numbers. Many examples feature money problems, it might be discussing people with different wages or spending issues it is important that those in the better financial position are not always depicted as one gender or race.

Citizenship

In Mathematics pupils often have a problem connecting topics to the real world and our society. Pupils will often question, why are we learning this, how will I use this? We introduce the subject to each new class with an openness and honesty. We make pupils aware that not every skill they are taught will be personally used by them but that we teach them as many skills as possible to enhance their problem-solving abilities and keep their future options as wide as possible.

Instead of trying to convince pupils they will need every single skill in their working life we try to teach them an awareness of which industries these skills are used in and appreciation of it's embeddedness in art and media they enjoy and services which keep us healthy.

Students in this subject are encouraged to question but the question is not "When will I use this." but "Where is this used in society?"

Independent Learning

Research skills

Using the online website Hegarty maths forms a part of our curriculum, fortnightly students are given time in the computer room to access this software. It provides instruction videos and then has quiz questions associated with them. Students need to use the correct part of the video to match any problem they are working with and need to know when to ask for help, which is a part of independent learning.

They are also encouraged to explore how the curriculum fits together and learn how to access tasks which match their particular needs. When revising in class we will take students through a process from identifying what topics they need to revise, to how they would use the right key words to find the correct video and use their class book to ensure it matches what they need.

Metacognition

Throughout the study of mathematics, we ensure students are aware of their own understanding and thought processes. Within lessons we regularly build in time for students to reflect on their learning. We also work with our students across the school to help them understand which learning style best suits them- we then offer a range of activities in class to meet these needs.

Across the whole school we use REK activities at the start of every lesson- encouraging students to reflect on prior learning and recall it. We use schemas as live documents which students update throughout the scheme of learning to make links between concepts they are studying and see how everything links together.

After assessments, students have dedicated improvement time to reflect on their performance. Through feedback, we work with students to help them unpick why they received the mark they did and what they would need to do to improve this mark. We provide students with checklists at the beginning of a unit and the end, they are encouraged to try and link the questions they have answered in the test to written descriptions of the skills, reflecting on the ones they have improved on, were already strong at or areas that need to be improved. We also go through these as a class so those they can get stronger at doing this independently.

Links with other subject areas

Year 7 – Autumn

- Using graphs to analyse data surrounding population, recycling, tide heights, wind speed etc (Geography).
- Using averages to analyse performance (P.E).
- Using LCM to synchronise designs. (Technology).
- Understanding and reading temperature in the positive and negative scale (Science)

- Solving physics problems by completing calculations with powers and roots (Science – Physics)
- Substituting values in to formulae (Science – Physics)
- Using formulae to calculate appropriate cooking times (Food technology)

Year 7 – Spring

- Polygons and patterns (Art)
- Re-arranging Formulae (Science)

Year 7 – Summer

- Converting measures (Science)
- Volume (Science)

Year 8 – Autumn

- Calculating with really large or small objects using standard form (Science)
- Learning prefixes associated with energy and computing Giga, Mega etc (Science and computing)
- Rounding to significant figures for real life values (Science)
- Substituting values into formulae (Science – Physics)
- Cylindrical volume (Science)
- Plotting graphs for physics experiments (Science – Physics)
- Plotting graphs for running performance (P.E)
- Analysing population graphs (Geography)

Year 8 – Spring

- Reflections and rotations (Art and Design)
- Modelling Growth (Science)
- Calculating percentage increase for experimental observations (Science)
- Looking at changes in population after significant past plagues (History & Science)
- Plotting travel directions on a map using angles (Geography)
- Using scales to work out real life sizes on a map (Geography)

Year 8 – Summer

- Deeper focus on maps and scales including using bearings (Geography)
- Modelling non linear graphs such as half life graphs (Physics)

Year 9 – Autumn

- Learning prefixes associated with energy and computing Giga, Mega etc (Science and computing)
- Substituting values into formulae (Science – Physics)

Year 9 – Spring

- Looking at time series graphs for rainfall (Geography)
- Using Stem and leaf graphs to compare populations (Science and Geography)
- Using Pie charts to compare sports statistics (P.E)
- Using Scatter graphs to spot trends from a 2 variable experiment (Science)
- Splitting lengths into fractional portions (Design)

Year 9 – Summer

- Rotations, reflections and lines of symmetry (Art)
- Using averages to analyse performance and experimental results (P.E and Science)
- Using range to measure consistency of sporting performance (P.E)
- Picking fair samples (Science)
- Changing between different measures (Science)
- Finding the volume and surface area of an object (Science)

Year 10 – Autumn

- Working out gradients for ramps (Design)
- Plotting graphs for physics experiments (Science – Physics)

- Plotting graphs for running performance (P.E)
- Translating shapes and objects (Art and Design)

Year 10 – Spring

- Using scales to work out real life sizes on a map (Geography)
- Calculating ratios of materials in metallic compounds (Science)
- Working out proportions of various chemicals needed in a mixture for an experiment (Science)
- Making observations about the relationship between two variables (Directly, indirectly proportional) (Science)
- Calculating the diagonal distance between two points on paper or in space (Design) (Science)
- Modelling the distance to a point based on visual observations and visual angles (Science – Physics)

Year 10 – Summer

- Calculating percentage increase and decrease of experimental observations (Science)
- Using percentages to model growth and decay (Science)
- Learning how to calculate the compound measures (Speed, Density and Pressure) (Science)
- Calculating the bearing of a directions (Geography)
- Calculating the Loci (movement path) of an object (Physics)
- Drawing Plan, Front and side elevations of a 3D object (Design)
- Drawing plans to a particular scale (Design)
- Using compass and protractor to draw objects with 100% accuracy (Design)
- Plotting quadratic graphs for curved motion (Physics)