

## The Pingle Academy 2019.20



### Mathematics Curriculum Rationale

#### VISION

“Our aims are to create independent learners with all the skills necessary to succeed in and comprehend the modern world.”

The mathematics faculty aims to provide a worthwhile and enjoyable educational experience for all our students regardless of whether or not they go on to study a mathematics subject at a higher level. It is vital that we provide students with the mathematics skills they will need in later life as well as that needed to pass the GCSE examination.

#### INTENT

We aim to create the very best Mathematicians by challenging students to think, act and speak like those working in the field would. We do this by quality first teaching which ensures students understand underlying Mathematical principles and can apply them in a variety of familiar and unfamiliar contexts, encouraging students to make connections between ideas and topics. Our curriculum at The Pingle Academy goes far beyond what is taught in lessons, for whilst we want students to achieve the very best examination results possible, we believe our curriculum goes beyond what is examinable. As a faculty we offer opportunities for individual competition through the UKMT at KS3 and KS4. Students are explicitly taught strategies to solve problems and are encouraged by teacher modelling to be able to express themselves in Mathematical language. The faculty is working to implement the Rosenshine’s Principles of Instruction to engage and motivate pupils and demand their active participation. As knowledge engaged curriculum we believe that knowledge underpins and enables the application of skills; both are entwined. As a faculty we define the powerful knowledge our students need and help them recall it, as retrieval tasks are a common feature of Maths lessons. All students have individual Mathswatch login codes to access homework tasks and structured revision for assessments. Real life applications of Mathematical ideas are made explicit to students whenever possible. Further rationale behind our curriculum design includes trying to make learning ‘stick’ by having a spiral curriculum. The five main areas of; number, algebra, ratio, geometry and data are taught in a cycle. Each time students revisit an area, they are exposed to more complex content, building on what they have already learnt. We ensure the level of challenge is high enough for the most able, with scaffold and support available for students who require and need it.

#### IMPLEMENTATION

Sequencing at Key Stage 3, there is a focus on the basics of number and algebra. The sequencing is designed to allow for interleaving of content; the placement of each unit within the scheme of work allows for knowledge to easily be transferred into the following topics allowing for links between domains to become visible.

As a result, much of the Key Stage 3 scheme of work contains the following progression sequence: Number > Algebra > Geometry and Statistics. Each section of the scheme of work references the prerequisites and dependants for that unit. This is in order to ensure that teaching builds on the knowledge and skills that students have, whilst ensuring that topics are taught in a way which best prepares them for success in future topics. Priority has been given to the topics which are heavily built

upon at Key Stage 4 and 5. Some topics which are traditionally taught at Key Stage 3, such as constructions, bearings and transformations are not included in the curriculum until Key Stage 4, because they are not prerequisites for multiple other topics.

As a result of removing some topics from KS3 and reducing the time spent re-teaching, there is the opportunity to spend more time on each topic, allowing it to be studied in greater depth. This provides the opportunity for additional practice, improved links between topics and successful encoding of knowledge and skills into long term memory. As Rohrer and Taylor (2006), found: *'the retention of Mathematics is markedly improved when a given number of practice problems are distributed across multiple assignments and not massed into one'*.

Each unit of the scheme of work has been broken down into carefully selected components so that new content is taught in small chunks, in order to ensure that working memory is not overloaded. When introducing new learning, methods such as Example-Problem Pairs and activities based on Variation Theory should be used to ensure students can manage the flow of new information they receive and make connections to previous learning. By minimising intrinsic load in this way, students are more likely to encode information into long term memory, in line with the principles of cognitive load theory (Kirschner et al, 2006).

#### Problem Solving

The curriculum focuses on developing the skills and knowledge required in order to think like an expert within a particular domain, rather than focusing on generic problem solving skills. Once these skills have been mastered, the development of problem-solving skills comes through the interleaving of previously covered content within each topic, where students are required to choose between techniques in order to solve problems.

#### Core and support curricula

At Key Stage 3, there are 2 tiers to the scheme of work: core and support. The support curriculum begins at a lower start point and contains a greater emphasis on concrete and pictorial representations prior to encountering abstract concepts.

See overview attached

Maths moments are means to encourage students to think about the application of maths across the school curriculum as well as in everyday life outside of classrooms.

#### **IMPACT**

There are 3 summative assessments per year. These assessments will test all of the knowledge and skills that the students have developed up to that point. The third Year 9 assessment will therefore assess all of the knowledge that has been taught at KS3, with no bias in favour of recently taught topics.

Since *'learning is a change in long term memory'* (Kirschner et al, 2006), the aim of these assessments is to provide a proxy for the extent to which all of the content which has been taught has been mastered, rather than assessing performance. Each assessment therefore aims to cover questions from a range of difficulties, ensuring that students at different attainment levels can be distinguished between.

Formative assessment, during which students are given advice on how to improve, should be a regular feature of each lesson as part of responsive teaching. Exit tickets and topic reviews should be used as formative assessment strategies. The intent here is to use these strategies to assess performance rather than learning. Success within a lesson sequence does not provide an indication of learning, but failure to demonstrate competence is unlikely to lead to learning.

At KS5 students will be undertaking regular formative assessment using past exam questions.