Maths

Personal Development statement

At the essence of our philosophy in Maths is the need to act upon the specific anxieties that students attribute to the subject. Encouraging students towards a growth mindset by developing their resourcefulness and resilience in unfamiliar problems. We use a variety of strategies to develop this mindset including: Low stakes testing, Removal of time pressures, working both collaboratively and independently, understanding and memorisation of key results and formulae and supporting and encouraging an exploration of number and geometry. With consistent and persistent application of these strategies we support our students in achieving fluency without fear. As students develop their understanding of Maths and the wider world, we link the Mathematical curriculum to news articles and events that are relevant to their lives.

SMSC Statement

The Mathematics Department at Sheringham supports the development of SMSC in the education of its students not only through specific topics in the curriculum but also the ethos of the department. The development of critical thinking skills enables students to analyse, evaluate and reflect upon their solutions which fully complements the BLP philosophy of the school.

Mathematics is a fundamental skill used both explicitly and implicitly in both employment and every-day life, the social element of SMSC is at the core of our mathematics education.

Throughout their time at Sheringham high students are exposed to the real-life application of mathematics, and our course particularly emphasises the problem-solving element of the syllabus.

Key Stage 3

	Spiritual Examples: sense of self, unique potential, understanding strengths and weaknesses, curiosity about themselves and their place in the world increases, fundamental questions. Students develop the knowledge and skills to foster their own inner lives, non-material wellbeing and creativity.	Moral Examples: right and wrong, moral conflict, a concern for others, will to do what is right, reflect on the consequences of their actions and learn how to forgive themselves and others. Students develop the knowledge/skills necessary to make responsible moral decisions.	Social Examples: the responsibilities, rights of being members of families and communities (local, national and global), ability to relate to others and to work with others for the common good, belonging and participating, active contribution to the democratic process, sense of community and pro-social action.	Cultural Examples: cultural traditions, respect for their own culture and that of others, an interest in differences. Ability to understand, appreciate and contribute to culture.	Personal development Examples specifically related to: Healthy relationships/ friendships Health Education / mental health / physical health / internet safety/drugs and alcohol/ healthy eating/ preventing poor health (personal hygiene)/ basic first aid/ adolescence
Statistics					
Year 7 & Year 8	Sampling and Questionnaires	Representing Data Data collection and representation allow	Representing Data Use of statistics as a way of measuring and	The three averages Using the word "Average" in a	Maths problems persist in dividing populations into Male/Females. These questions provide the opportunity to

Collecting data and working to eliminate sources of bias allow students to explore their own unconscious beliefs and identify this in others.	students to visualise the different opinions/ values and priorities of others. Students develop the understanding of modal opinions/options guiding decision making	making sense of the world around us. Geographical data comparing populations, climate, environment data of different countries	deliberately ambiguous way to influence the evidence for particular decisions	discuss the difference between Gender and Sex. Lesson idea Sleep: The correlation between sleep and performance in school The characteristics and evidence of what constitutes a healthy lifestyle and maintaining a healthy weight (including the links between an inactive lifestyle and ill health, such as cancer and cardio-vascular ill health

		Number		

Calculations The pleasures and rhythms of counting 'Music is the pleasure the human soul experiences from counting without being aware it is counting' Leibniz.	Directed number Developing students' understandings of the language of positive and negatives and the concepts that these can cancel	Powers of 10/Negative numbers Development of students understanding of the number system enables them to visualise large and small numbers in not only in other subjects but also in the news	BIDMAS The concept of a convention that is universally agreed upon to standardise a process.	Development of financial understanding – positive and negative balances and percentage change in sales and price increases.

		Geometry and Measures		

Transformations Extend the study of transformations to include Islamic tiling patterns and Rangoli patterns	Units and Measures Conversions between different units to communicate the same quantity	Units and Measures Conversions between different units to communicate the same quantity. Discussion where different units are used (metric and imperial) Shapes How shapes are featured in different religions, such as pyramids in Ancient Egypt.	Units and Measures Discussion where different units are used (metric and imperial) Shapes How shapes are featured in different religions, such as pyramids in Ancient Egypt.	Units and Measures As a consequence, students can better understand the data relating to their health (as provided by a health professional) e.g. Height, Weight. BMI **Please note that this will not be explicitly taught due to students with disordered eating conditions** Discussion of different types of measurements, which units are used at home, comparison of metric and

				imperial units. – Understanding of the appropriate quantities of food, cleaning materials etc. **General** In year 7 we start to challenge the popular fixed mindset and develop problems solving skills and resilience in students.
		Algebra		
Development of the concept of properties – the name of the variable is of no consequence, it is the properties that are significant.			The use of symbols to represent numbers, developing the understanding that a letter can represent any number. Draw students' attention to the roots of algebra in the Middle East and India.	

Key Stage 4

	Spiritual Examples: sense of self, unique potential, understanding strengths and weaknesses, curiosity about themselves and their place in the world increases, fundamental questions. They develop the knowledge and skills to foster their own inner lives, non-material wellbeing and creativity.	**Moral** Examples: right and wrong, moral conflict, a concern for others, will to do what is right, reflect on the consequences of their actions and learn how to forgive themselves and others. They develop the knowledge/skills necessary to make responsible moral decisions.	**Social** Examples: the responsibilities, rights of being members of families and communities (local, national and global), ability to relate to others and to work with others for the common good, belonging and participating, active contribution to the democratic process, sense of community and pro-social action.	**Cultural** Examples: cultural traditions, respect for their own culture and that of others, an interest in differences. Ability to understand, appreciate and contribute to culture.	**Personal development** **Examples specifically related to:** Healthy relationships/ friendships Health Education / mental health / physical health / internet safety/drugs and alcohol/ healthy eating/ preventing poor health (personal hygiene)/ basic first aid/ adolescence
			Number		
Year 9	Standard Form/Powers Development of understanding of science and the magnitude of space	Multiplicative reasoning Developing understanding of percentages and their application within financial products. Is it	Multiplicative reasoning Understanding of speed and the requirements of seed	Promote mathematical links to other subjects e.g. dates, data, distance, quantities.	Equivalence of fractions, decimals and percentages and the validity of comparisons between them. Link to Food nutrition labelling and healthy eating.

		ethical for pay-day loan companies to target and charge the people that they do?	limits within communities.		Multiplicative Reasoning Online safety: If I take this image and share it with four of my friends and the next hour they share it with 4 of their friends etc, how long until 10000 people have seen this image How information and data is generated, collected, shared and used online (Ofsted framework)
		Algebra			
	Sequences Fibonacci sequence which is evident in nature all around us			Graphs Being able to use a graphs to graph conversion rates between currencies/ units of measurements	Problem solving approach – seeking systematic order to solve a problem by breaking down a task into manageable parts.
		Geometry			
				Trigonometry and Pythagoras Historical contribution of other societies to our understanding of geometry e.g. Pythagoras Developing the understanding of geometric shapes in our environment, for example design of products, architecture and the effect on society.	

		Number			
	<u>Prime Factor Decomposition</u> Study of prime numbers as the building block of mathematics can lead to a discussion of the 'mystical' nature of these numbers	<u>Multiplicative Reasoning</u> Is it right that payday loan companies profit off the most financially vulnerable in life?	<u>Prime Factor Decomposition</u> Study of prime numbers as the basis of our security systems online.	<u>Calculations</u> This includes different multiplication methods from Egypt, Russia and China and evaluation of methods for multiplication that periodically appear as viral Memes The understanding that Maths is a universal language which transcends borders and language barriers. Understanding that some cultures prohibit earning interest on financial products.	Problem solving skills and team work will be developed. Opportunity for students to acquire critical thinking, skills of analysis, evaluation and reflection. Encouragement of self-discipline as problems become more complex with multiple steps. Students will develop the ability to review and check back through their working to eliminate errors. Problem solving fosters resilience as students try different methods to solve real life questions Financial investments (depreciation and appreciation of values, exponential growth and decay).
Year 9 after Easter **Year 10 & Year 11**	Algebra				
	<u>Proof (Higher tier)</u> Development of the rigour of proof and the meaning of proof in Mathematical terminology. <u>Solving equations</u> The enjoyment/ success/ achievement/ coping with short term failure as students develop their strategies for solving equations.				Problem solving approach – seeking systematic order to solve a problem by breaking down a task into manageable parts. Lesson Idea Looking at the interest rates of loan companies. What is the difference between a payday loan and bank loan? What would happen if you were to default on payments for 3 months? The similarities and differences between the online world and the physical world, including: the impact of unhealthy or obsessive comparison with others online

					(including through setting unrealistic expectations for body image or how people may curate a specific image of their life online); over-reliance on online relationships including social media; the risks related to online gambling including the accumulation of debt; how advertising and information is targeted at them; and how to be a discerning consumer of information online (Ofsted framework
	Geometry				
	Circles and Pi An introduction to Pi as an infinite number, link to its use in astronomy.			Circles and Pi Discussion of the independent discovery of Pi by various cultures and the work carrying on today across the globe investigating this fascinating ratio. Pythagoras Introduction to Pythagoras, link to the importance of Greek mathematical knowledge and its rediscovery during the Renaissance.	
	Statistics				
	Questionnaires Discussing the boundaries of what is acceptable to include in a questionnaire when incorporating personal/sensitive questions (GDPR)	How the use of statistics has changed the way that people view health, diet and lifestyle choices	Analysis Exploration of the manipulation of statistics by the media. Collecting Data Collection of own data, analysis and	How some cultures value data and maths, opposed to other countries driven by religion and tradition.	Lesson Idea **Gambling:** **Probability of winning in particular games in casinos – does the house always win?** The similarities and differences between the online world and the physical world, including: the impact of unhealthy or obsessive comparison with others online (including through setting unrealistic expectations for body image or how people may curate a specific image of their life online); over-reliance on online relationships including social

			presenting results in groups. How data collected about an area may affect placement of a business or price of housing. Links to the economic growth or decline of an area.		media; the risks related to online gambling including the accumulation of debt; how advertising and information is targeted at them; and how to be a discerning consumer of information online (Ofsted framework) **Fake news** **https://tylervigen.com/page?page=1** **How information and data is generated, collected, shared and used online (Ofsted framework)** **SMSC days 2021/2022** Financial maths sessions planned – currently how your Financial choices can affect your mental health and Understanding the deductions on your payslips.
			Key Stage 5		
	Spiritual Examples: sense of self, unique potential, understanding strengths and weaknesses, curiosity about themselves and their place in the world increases, fundamental questions. They develop the knowledge and skills to foster their own inner lives, non-material wellbeing and creativity.	**Moral** Examples: right and wrong, moral conflict, a concern for others, will to do what is right, reflect on the consequences of their actions and learn how to forgive themselves and others. They develop the knowledge/skills necessary to make responsible moral decisions.	**Social** Examples: the responsibilities, rights of being members of families and communities (local, national and global), ability to relate to others and to work with others for the common good, belonging and participating, active contribution to the democratic process, sense of community and pro-social action.	**Cultural** Examples: cultural traditions, respect for their own culture and that of others, an interest in differences. Ability to understand, appreciate and contribute to culture.	
A Level Maths			Mechanics Development of systems and structures that are safe for the public and able to state assumptions and limitations of the modelling process.	Statistics Working with real life data sets within the course to add context to statistical work and comparisons in climates between different time periods.	Understand mathematics and mathematical processes in a way that promotes confidence, and enjoyment for the subject. Understand how different areas of mathematics are connected and linking this to history. Use mathematical knowledge to make logical and reasoned decisions in solving problems both within pure

				Finding patterns and correlation between to variables and connect them to patters in the real world.	mathematics and in a variety of contexts. Read and comprehend articles and data sets concerning applications of mathematics and communicate their understanding Take an increased responsibility at A Level for their own learning and the evaluation of their own mathematical development.
Further Maths	Decision Maths Development of algorithms to develop the decision-making process – is this morally and ethically sound heading towards the singularity?				

Possible areas for development – The DADP includes the development of low stakes testing to help reduce Maths anxiety.

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					Specific strategy to reduce Maths Anxiety Using visual/concrete representations of problems to support the development of the Abstract concepts. Specific Strategy to reduce Maths Anxiety Encourage students to talk to their parents about financial reasoning.

				Specific strategy to reduce Maths Anxiety In these topics students see maths that they see in everyday life and can see the relevance to their lives. Specific strategy to reduce Maths Anxiety Focusing on the process rather than the end result – developing problem solving strategies. Specific strategy to reduce Maths Anxiety Where appropriate, learning about maths in context to help students develop their " number sense" Removal of time restraints when dealing with challenging problems