Medium term plan
Subject: *Project*
Title: Code Breakers

ST. MARY MAGDALENE C OF E SCHOOL
PENINSULA CAMPUS
Excellence through innovation, founded in faith since 1840.

Synopsis	
Students will investigate the purpose and importance of cryptography, from its origins to its use in WWII and its implementation in the present day. Students will learn how to use basic algorithms in order to understand encryption and how codes and ciphers are made and broken. Students will learn about key historical events in the history of code breaking and make connections between civilisations that have developed encryption. By the end of the project, they will understand how to solve code-breaking challenges and create a programme using scratch that will encrypt and decrypt messages.	
Key content – knowledge and skills	**National Curriculum aims and subject content descriptors**
Computing: Knowledge of the application and design of cryptography and systems that implement such security systems. Knowledge of computational thinking, algorithms, the use of cryptography in real-world problems and physical systems. Skills will be developed in basic coding including the use of software and hardware, and an understanding of how coding can be applied. **History:** Knowledge of the significance of cryptography and its impact on ancient, medieval and modern societies and civilisations, along with understanding the connections between these civilisations and technological developments. Knowledge of methods of enquiry and skills in analysing evidence.	**Computing:** COa1, COa2, COa3, COa4. COsc1, COsc2, COsc5, COsc6, COsc9 **History:** HIa2, HIa5, HIa6. HIsc4, HIsc6, HIsc7.
Key assessment points	
Week 1: Week 1: Students to produce a tittle page on what they think cryptography is about using images and text and linking ideas to the Greek and Roman civilizations. Week 2: Students will write a paragraph explaining what they learned about code breaking and the use of technology from the IWM visit. Week 3: Students will present the encryption method they have been working on in school and at home to the class with specific guidelines provided on what is expected as part of their research. Week 4: Write an essay about the history of encryption and how civilizations in ancient, medieval and modern times applied cryptographic methods. Week 5: Create an E-safety poster advising others on how to be safe online. Discuss possible threats and precautions to put in place and how to be responsible online. Week 6: Create a programme in Scratch that will encrypt and decrypt plaintext and cipher text. Students to answer an exam style question: 'Which early civilization(s) influenced the codebreakers of Bletchley park's ability to crack the enigma code?'	
Out of lesson learning	
Full day trip to the Imperial War Museum to explore how technology was used during the war, how it changed the course of the war and what influence technology had on subsequent wars, in particular the cold war. A second option is the postal museum. Trips will be dependent on availability of exhibitions.	
Resources	
Worksheets surrounding ancient, medieval and modern cryptography. Help-sheet and guidance for written tasks. Plain cipher wheels and accompanying pins. Computers with Scratch software. Worksheets to assist students with the trip to the imperial war museum to answer questions during the trip based on the use of technology.	
Christian ethos	
Both the curriculum and group work should develop in students a responsible moral attitude as members of a responsible, safe and considerate online world, recognising that Christian ethics are as important online as offline. Students will understand and be able to recognise and also discuss how Christian values were applied in the history of cryptography.	

Medium term plan

British values
Students will be able to understand and explain how the British used cryptography to their advantage during the Second World War and the relevance of this to the defence of liberty and democracy. The project will also involve discussions around the importance of privacy and the role of encryption in maintaining or undermining the rule of law.

Unit: *Code Breakers*

Weekly overview

Week	**Focus**
1	Introduction to cryptography: Students will define key words used in describing cryptography such as plain text, cipher text and key. Students will watch a series of videos describing cryptography and how and why cryptography was used in ancient times by the Greek and Roman civilizations. Introduce pupils to the staff/skytale cipher used by the Greek civilization and Caesar cipher used by the Romans. Explain the use of cipher wheels and how they work. Students will work in pairs to encrypt and decrypt messages using both Skytale and shift cipher techniques. Students will explore how these cryptographic methods impacted on society at the time through class activities.
2	Students will begin to study the medieval and renaissance forms of cryptography as well as methods applied by the Arabic civilisation. Students will have a learning visit to the Imperial War Museum to visit the first world war, turning points and peace and security exhibitions to learn about how technology was used during the war and the impact it had on the outcome of the war. Students will learn about cryptography from 1800 and between WWI and WWII. They will conduct online research to describe the different methods used during those times. Discuss the work of the codebreakers at Bletchley park, the Enigma machine and how codebreaking influenced Britain during that time.
3	Create a presentation about the history of encryption so far using PowerPoint. Students will put the cryptography methods in chronological order and produce a timeline showing significant events within the 3 time periods (ancient, medieval and 1800-WWII). Discuss what algorithms are and how they are used in codebreaking to solve problems. Introduce students to flow charts and pseudocode as ways of breaking down problems, linking to Alan Turning's Pilot Ace computer. Discuss modern cryptography methods such as asymmetric and symmetric cryptography and the use of algorithms and the hardware and software used to encrypt and decrypt messages. Students will create a presentation explaining a method of encryption not discussed in class. They will work in pairs to present their findings to the class and explain the technique they have chosen and whether or not it is an effective method of encryption. Other students watching the presentation will peer assess each pair and provide feedback after each presentation. Begin to plan the essay about the history of encryption and how civilisations from the different time periods influenced modern day encryption.
4	Students will be introduced to programming in Scratch. They will begin by learning how to use the different features of the program and learn to use key commands. They will create a simple game using animation and a mixture of text to make sprites perform specific tasks. This will be linked to algorithms as students will be applying the same concept of problem solving to create a game. The difficulty levels will be increased to meet the level of each student by adding additional commands or creating a new game with challenging specification.

Medium term plan

	Students will be given their final project tittle to create a program that will encrypt and decrypt messages. They will begin to plan their program and create a final draft of their plan. Hand in essay about the history of encryption.
5	Students will learn about the importance of being safe online and how to spot and protect one's computer from virtual threats. Students will also discuss how to keep themselves and others safe online. Discuss the implications of plagiarism and how this has a larger implication on society. Students will begin to create their program on scratch for their encryption project.
6	Complete work with Scratch and submit final project. Conduct peer- and self-analysis of cipher program that each student will present and explain to the class. Students will be given an essay style question to answer. This will be broken down with explanations on how to tackle the question.