# Lesson 8 – Radio Communication

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| The Big Picture – Why Is This Relevant? | Learning Objectives |
| * Most computing devices need to communicate with other devices. As many devices are wireless, they need to be able to transmit messages using radio communication. * Learners will study how radio communication works and how messages can be protected whilst they are being transmitted | * Understand the need for devices to be able to communicate with each other * Understand the need for encryption when transmitting data wirelessly * Use basic ciphers to encrypt and decrypt messages |
| Engagement – How Can I Engage Learners? | Assessment for Learning |
| * Learners will be used to connecting their devices wirelessly to other devices and the internet. This lesson will help them to understand how this works. * Learners will enjoy cracking codes using simple ciphers to identify secret messages | **Expected Progress:**   * Learners will understand the need for devices to be able to communicate with each other and will be able to identify the blocks that would be needed to program a micro:bit   **Good Progress:**   * Learners will understand the need for security when information is being transmitted wirelessly. They will be able to use a simple cipher to decrypt a message   **Exceptional Progress:**   * Learners will understand the need for encryption when data is being transmitted wirelessly and will be able to determine their own cipher to encrypt data |
| Links to Key Stage 3 Programme of Study | |
| Understand a range of ways to use technology safely, respectfully, responsibly and securely  * Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems | |
| Key Concepts | Key Words |
| * Mobile devices need to use wireless signals to communicate with other devices * As the data is being transmitted wirelessly it is possible that someone could intercept the data * Data needs to be secured prior to being transmitted using an encryption algorithm. This means that if the data is intercepted it is meaningless * Ciphers are used to encrypt and decrypt messages * The Caesar cipher is one of the oldest and simplest ciphers | * Radio waves * Transmitter * Physical Objects * Cipher * Encryption * Encoding * Intercept * Channels |
| Differentiation | Resources |
| More capable learners should be able to develop their own ciphers. They could write a secret message using their own cipher and then ask a friend to see if they can crack the code. They may wish to use the internet to research different ciphers. | * Lesson 8 ppt * Cipher Worksheet * ReceivingData.hex * SendingData.hex |
| Lesson Flow | |
| * Ask Learners if they know how mobile devices communicate with each other * Discuss how radio waves are used to transmit data from one device to another * Highlight the fact that data that is being sent via radio waves through the air could potentially be intercepted * In order to protect the data whilst it is being transmitted it is necessary to encode or encrypt it. This means that if it is intercepted it wouldn’t have any meaning. The process of encoding the data is called encryption. * Lots of different methods can be used to encrypt data. The algorithm that is used to encrypt the data is called a cipher * One of the most straightforward ciphers is the Caesar cipher. This uses a shift to change the letters. For example, if the shift was +3 the word ‘cat’ would be encrypted to ‘fdw’. * Learners should then work through the Cipher worksheet * Demonstrate where the radio blocks can be found in MakeCode. Use the ppt to demonstrate a simple program. Learners should then pair up to send a message between two micro:bits, use the final slide of the ppt to support this activity. Each pair should be asked to use a different radio group. * Learners will use radio blocks when they develop a rock:paper:scissors game over the next two lessons. If there is time students should attempt aim to complete the extension activity from lesson 1 which was to produce a flowchart highlighting the processes involved in the rock, paper, scissors game. | |
| Making | |
| There is no making in this lesson. | |