

## ACTIVITY 6

### Practical activity

#### Objective:

In this activity, you will apply the concept of symmetric encryption to encrypt and decrypt a message, understanding how confidentiality is maintained using a shared key. You will practice using an online encryption tool and work with a simple encryption method to protect your data.

#### Instructions.

#### Materials Needed:

- Internet access
- Computer or mobile device
- Access to a secure symmetric encryption tool for example <https://cryptii.com/pipes/xor-encryption>.

### Step 1: Understanding Symmetric Encryption

Before starting, take a moment to read through the following explanation:

- Symmetric Encryption uses the same key for both encryption (scrambling the message) and decryption (unscrambling the message).
- **Encryption:** Converts your plain text message into unreadable ciphertext.
- **Decryption:** Converts ciphertext back into the original plain text using the same key.
- **Key:** The shared secret between the sender and the receiver that allows them to encrypt and decrypt the message securely.

**Example:** Imagine you want to send a secret message to your friend. You both agree on a secret word as the key, say "apple". Using this key, both of you can encrypt and decrypt each other's messages.

### Step 2: Choose Your Message

Think of a short and simple message you'd like to encrypt. Here's an example to get you started:

- **Message:** "Symmetric encryption is fun!"
- Write down your message in a text editor (like Notepad, Google Docs, or any virtual document you are using for the activity).

### Step 3: Choose a Key

You need a key that will be used to encrypt and decrypt your message. This key should be something simple, like a word or number that only you and your partner know.

- Key Example: "apple"
- Write down your chosen key.

### Step 4: Encrypt the Message

Go to the Cryptii website: <https://cryptii.com/pipes/xor-encryption>.

1. Enter your plain text message in the Input box.
2. Set your key (for example, "apple") in the Key section.
3. Select XOR Encryption (this is a basic form of symmetric encryption).
4. The encrypted version of your message will appear in the Output box.

Now you have the encrypted message!

- Example: If your message was "Symmetric encryption is fun!" and your key was "apple", the encrypted message might look something like this:  
"Xkxzsnkrgrt bvnqtbmr fuq!"

### Step 5: Share the Encrypted Message

If you're doing this activity with a partner:

- Send the encrypted message (the one that appeared in the Output box) to your partner.
- Also, share the key with your partner (e.g., "apple"). This is essential, as they need it to decrypt the message.

### Step 6: Decrypt the Message

Now, it's your partner's turn (or you if you're doing it alone) to decrypt the message:

1. Open the same Cryptii website: <https://cryptii.com/pipes/xor-encryption>.
2. Paste the encrypted message into the Input box.
3. Enter the same key ("apple") in the Key section.
4. The decrypted message will appear in the Output box.

**Your partner will now see the original message!**

- **Example:** If they used the key "apple" and decrypted your message, they would see: "Symmetric encryption is fun!"

### Step 7: Reflection and Discussion

- How did the encryption work? Discuss how the shared key made the message readable only for the people who knew the key.
- What would happen if someone else knew your key? Reflect on how critical it is to keep the encryption key secure.
- Challenges of Symmetric Encryption: Think about the challenges of managing and distributing the keys securely in real-world scenarios, especially in large systems (e.g., online banking, messaging apps, etc.).

### Step 8: Optional - Share Your Learnings

If you're in a group or class, share your findings and experiences with others:

- Did you encounter any challenges when encrypting or decrypting?
- How could this method of symmetric encryption be applied to protect personal information or communications in real life?