

The background of the top half of the page is a dense, repeating pattern of white icons on a light blue background. The icons represent various technology and geek culture items, including laptops, smartphones, headphones, cameras, speakers, books, people, speech bubbles, and specific characters like the Doge meme dog.

Geek Squad Academy

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**GEEK SQUAD ACADEMY
CRYPTOGRAPHY – CODES & CIPHERS
ONLINE GUIDE**

Welcome to Cryptography – Codes and Ciphers!

For best results, be sure to read the full guide first before you get to work!

Cryptography is the art of writing or solving codes. Humans have been using cryptography to send coded messages to each other for hundreds of years. Archaeologists have even found examples of ancient peoples hiding their baking recipes on clay tablets! In this course, you'll learn about cryptography, and how to use codes and ciphers to encode (and decode) your own messages.

During this activity, experimentation is key - take the chance to discover, change things, and make mistakes. This is going to be awesome!

WHAT YOU'LL LEARN:

- Understand what cryptography is
- Create an encoded message with the Caesar Cipher
- Create an encoded message with the Polybius Square
- How to decode messages using the Caesar Cipher and Polybius Square
- Learn to encrypt messages with multiple ciphers or codes

MATERIALS NEEDED:

- ☐ Pencil
- ☐ Paper
- ☐ Laptop or Device with a web browser
- ☐ Internet access
- ☐ Websites:
 - www.cryptii.com
 - www.cryptii.com/pipes/caesar-cipher
 - www.cryptii.com/pipes/polybius-square

MODULE 1: INTRO TO CRYPTOGRAPHY

Imagine if you were caught passing a note in class, and the teacher read it out loud! Encrypting the message in your note is the best way to keep your messages safe. In order to keep our communication (or data) safe, we can “encrypt” the content of our messages.

HOW DOES CRYPTOGRAPHY WORK?

Cryptography is the art of writing or solving codes. Hiding a message using cryptography is called “encrypting”. Encryption is the process of converting information into a code, especially to prevent unauthorized access. Codes and ciphers are the keys to let us “decrypt” messages that are sent to us.

DEFINITIONS:

- Code – A system of words, letters, or symbols that are substituted for other words, letters, or symbols...for the purposes of secrecy.
- Cipher – A secret or disguised way of writing...in other words, a code!
- Ciphertext - The encrypted or encoded information that is unreadable without the proper cipher to decrypt it.
- Plaintext - Text that we can read. Decryption (the opposite of encryption) is the process of turning ciphertext into readable plaintext.

Don't worry, basic cryptography is easier than it sounds! At its core, it is about pattern recognition.

RECOGNIZING PATTERNS

The first step towards understanding the basics of cryptography is learning to recognize the patterns involved. Many ciphers and codes make use of complex combinations of letters, numbers, or shapes that follow a pattern to encrypt their message. If we know the pattern, we can decrypt the message and read it!

Each of the examples below follow a simple pattern that uses colours, numbers, or music notes. Can you guess what the next answer in each of the below patterns would be?

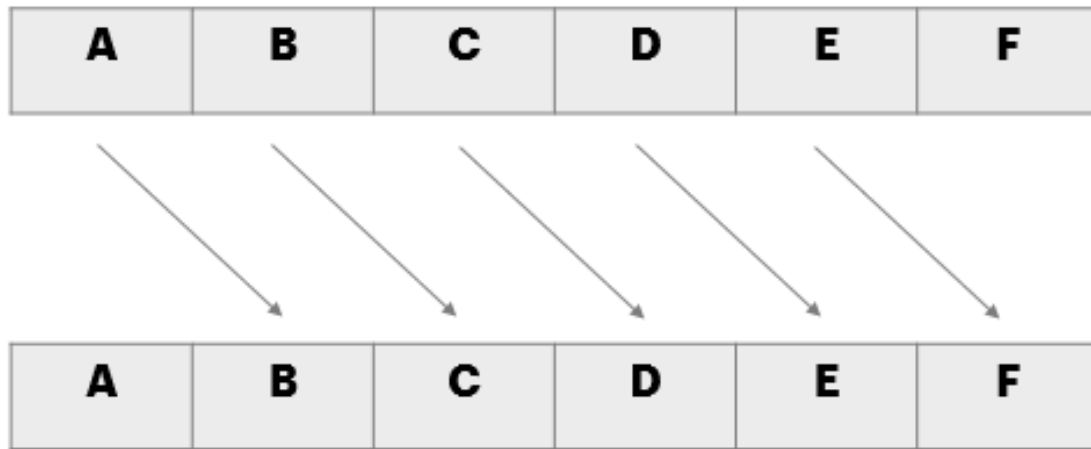


1 2 3 2 3 4 3 4 5 ?



CAESAR'S (WORD) SALAD

Julius Caesar was a Roman emperor who famously encrypted his messages using what we now call the “Caesar Cipher”.



Part of the Caesar Cipher

The Caesar Cipher is easy to use! First you must choose a “shift” number. We recommend using a small number, as they can be simpler to work with. In the above example, the shift number is 1.

The cipher takes a message and “shifts” each letter a specific number of places further into the alphabet. For example, if we chose 1 as our shift number, “ABCDE” would be encrypted to “BCDEF”.

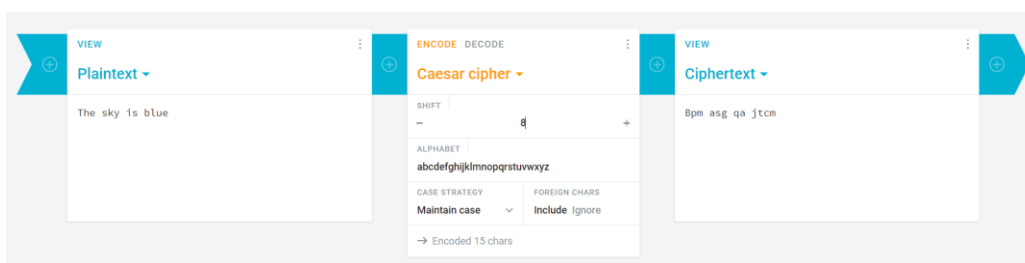
ACTIVITY 1: Caesar Cipher + Your Name

- **PRO TIP: You may find it helpful to write out two lines of the alphabet as your own Caesar Cipher for reference.**
- Encrypt your first name using a shift of 2.
- Encrypt your last name with a shift of 3.

You can use the Caesar Cipher to manually encrypt messages, but what if your message is quite long? Or what if you want to make your code more complex (e.g. using a higher shift number)? Luckily for us, there are websites that can help us encrypt messages quickly! **Cryptii.com** allows users to easily convert any text, using a wide variety of ciphers. It also allows you to decode messages quickly!

ACTIVITY 2: Cryptii.com + Caesar Cipher

- Open www.cryptii.com/pipes/caesar-cipher in a web browser.
- Write a message of 1-2 sentences into the Plaintext box on the left side.
 - NOTE: If you accidentally remove one of the boxes, refresh the webpage.
- Select “Encode” (it should be highlighted in orange).
- Select “Caesar cipher” from the dropdown menu, under “Ciphers”.
- Select a shift number between 1-10
- Watch the text turn into an encoded message in the Ciphertext box!
- **OPTIONAL: Try a few different “shift” numbers, and watch how your message changes. You can even pick an incredibly high shift number, such as 500!**

**ACTIVITY 3: Decoding using Cryptii.com – Caesar Cipher**

- Watch how **Cryptii.com** can decode a message quickly!
- Drag the “Ciphertext” box to the far left, and the “Plaintext” box to the far right. It should now be Plaintext + Caesar cipher + Ciphertext.
- Type (or copy + paste) the following message into the “Text” box on the left side. You can COPY using the keyboard shortcut of CTRL + C, and paste using CTRL + V:
Qoou Caekn Kmknowi Yxvsxo Vokbxsxq sc pboo, pex, kxn onemkdsyxkv
- Select “Decode”.
- Select “Caesar cipher” from the dropdown menu, under “Ciphers”.
- Pick 10 as your “shift” number.
- Watch the text decode!
 - HINT: It should say “Geek Squad Academy Online Learning is free, fun, and educational”

Take me to more Cryptography modules!

Comments, questions, or feedback? Email us at academy@geeksquad.ca.

Take me back to Geek Squad Academy Online Learning!