

MODULE 3: COMBINING CIPHERS

Now that we've conquered the Caesar Cipher and the Polybius Square, why not use them together? That's right! Some codes and ciphers are made of combinations of other codes and ciphers, or at least follow similar patterns.

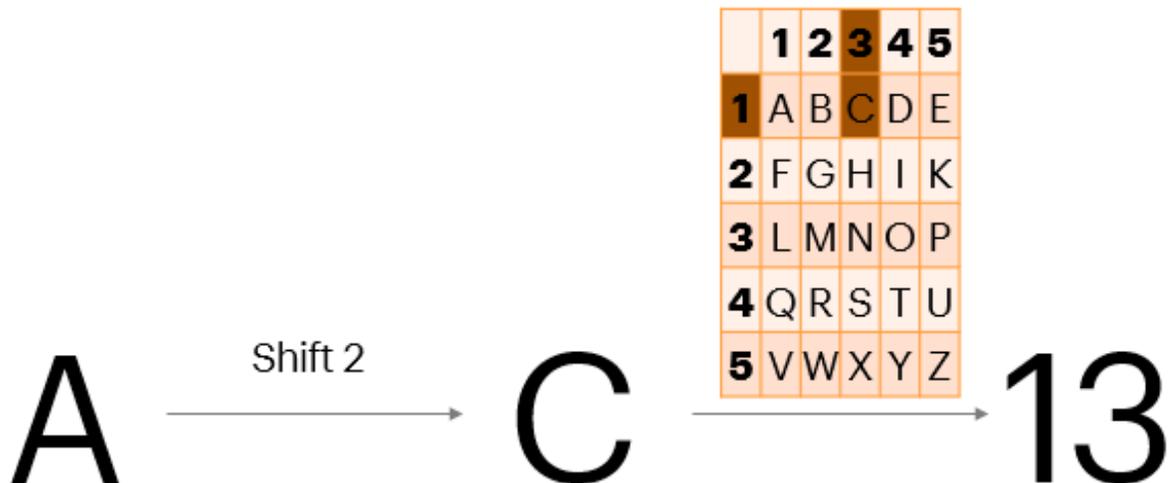
To make sure our messages are truly secure, we can use both the Caesar Cipher as well as the Polybius Square to encrypt our message. Imagination is the only limitation to cryptography! Your cipher can be as long and complicated as you'd like, as long as it follows a pattern.

PUTTING IT ALL TOGETHER

Using more than one cipher means following a pattern, and decoding them means spotting the pattern. When more than one cipher has been used, it's also called a "stacked" cipher.

ACTIVITY 6: Combination Ciphers

- Write down your first name on a piece of paper. Add your last name for more of a challenge!
- Use the Caesar Cipher to shift the letters. (You should have already done this for your first name in **ACTIVITY 1**)
- Once you've shifted the letters, use the Polybius Square to encode the letters as numbers.
- You've now successfully created a two-step (or stacked) cipher to encrypt your name!

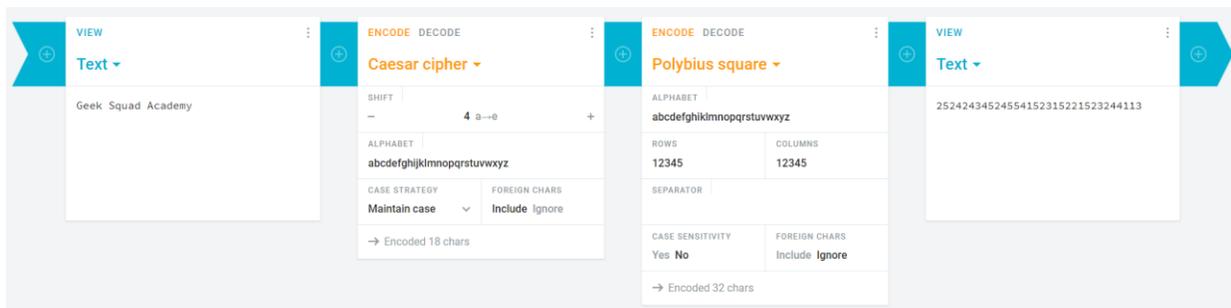


Encoding plaintext using the Caesar Cipher, and then the Polybius Square

[Cryptii.com](https://www.cryptii.com) makes it even easier to add more than one cipher! Why not give it a try?

ACTIVITY 7: Cryptii.com + Combination Ciphers

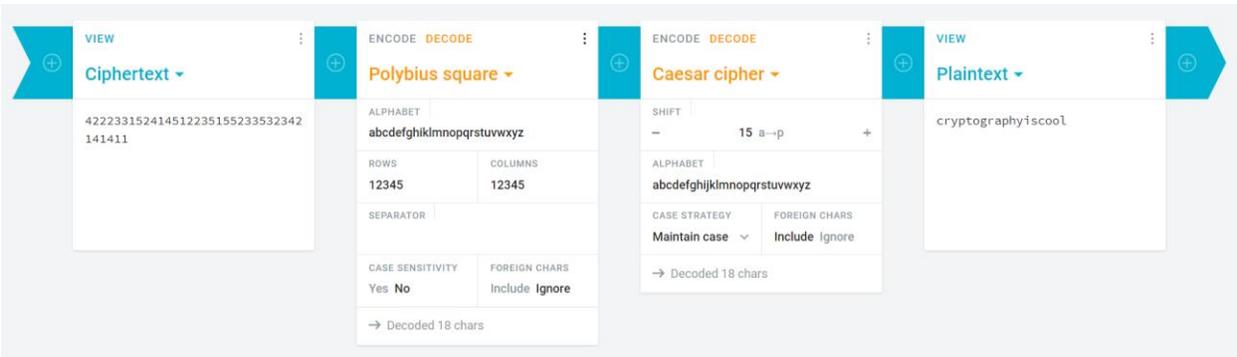
- Open www.cryptii.com/pipes/caesar-cipher in a web browser.
- Write a short message into the “Plaintext” box on the left side.
- Select “Encode” in the next box.
- Select “Caesar cipher” from the dropdown menu, under “Ciphers”.
- Select a shift number.
- Click on the (+) button to the right of the Caesar cipher box.
- Select “Polybius square” from the dropdown menu, under “Polybius square ciphers”.
- Another cipher box should appear.
 - NOTE: If another box does not appear, you can also click on the 3 dots on the side of the Caesar cipher box, and choose “duplicate”. Then select Polybius square cipher.
- Select “Encode” on the Polybius Square box.
- Watch the text encrypt into an extra secure message!



So how do you decrypt a stacked cipher? Let's give it a shot!

FINAL ACTIVITY: Cryptii.com + Double Decoding

- We encrypted a message for you, using the Caesar Cipher, followed by the Polybius Square. Can you decrypt it?
- Decoding works in reverse. This means that you'll need to start by decoding the message using the Polybius Square, before decoding using the Caesar cipher.
- Open www.cryptii.com/pipes/polybius-square in a web browser.
- Click on the (+) button to the right of the Polybius square box.
- Select “Caesar cipher” from the dropdown menu, under “Ciphers”. Another cipher box should appear.
- Drag and drop the “Plaintext” box to the far right and drag the “Ciphertext” box to the far left. It should now be Ciphertext + Polybius Square + Caesar cipher + Plaintext.
- Switch the ciphers to "Decode" instead of "Encode".
- Type (or copy + paste) the following message into the "Text" box on the left side:
422233152414512235155233532342141411
- Guessing the shift number will be a bit trickier! The easiest way to is to start at 1, and push the (+) button. Keep increasing the shift by 1, until the message in the Plaintext box decodes into a message that makes sense. Don't forget to add spaces between the letters!
 - HINT: It should say “Cryptography is cool” (Caesar Cipher shift is 15)

**WHERE CAN I GO FROM HERE?**

What can you do with your newfound cryptography knowledge? Well for starters, you can continue to explore Cryptii.com to create encrypted messages for your friends and family, or see if you can decrypt other people's messages! There are lots of different ciphers available on Cryptii that you can experiment with, including something called...a bacon cipher?!

If cryptography really interests you, you can even turn it into a career! Cryptographers often go to university to study computer science, math, or computer engineering. They are hired by lots of companies, as well as the government, to develop systems that will protect their data from hackers. Speaking of hackers, have you heard of white hats? A "white hat" is a person who hacks into a network to test its security system. That's right, you could get paid to be a computer hacker!

IF YOU LIKE CRYPTOGRAPHY, YOU MAY ENJOY OUR BENDING BINARY COURSE!

- In Bending Binary, you'll learn what the binary numbering system is, and how to convert numbers or letters into encrypted patterns that computers use.
- Learn more (and take) the course [here](#).

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