

DECIPHERING AND WRITING SECRET MESSAGES

Lina had to work hard to decipher the meaning of the letters on the torn document. In this activity, you can learn the basics of cryptography, or “code writing,” through the use of a simple cryptographic device. Then send and decipher messages with your friends.



Cryptography is a way of keeping messages secret even if others see them. When you put a secret message into a code, you **encode** it. When you receive a coded message, you have to **decode** it to read it. To do that, you need a **key** – an extra bit of information – to unlock the message.

MATERIALS NEEDED (1 of each for each student)

- ✿ COPY OF SECRET DECODER BADGE PAGE
- ✿ PENCIL
- ✿ PAIR OF SAFETY SCISSORS
- ✿ PAPER

PROCEDURES

Part I Encode a message (Make a secret message)!

- Cut out from Master A:
 - ✿ Secret Decoder Badge
 - ✿ The two small rectangles near the bottom of the Badge, throw rectangles away
 - ✿ The strip labeled “Alphabet A”
- Run the alphabet strip through the small holes on the decoder so that the center of the strip is displayed above the alphabet on the bottom of the decoder. The sides of the strip will be behind the decoder.
- Line up your decoder. The key tells which two letters to line up. Use CH for a practice key. Find the first letter of the key, “C” in the alphabet on the strip. Find the second letter of the key, “H” in the alphabet at the bottom of the decoder badge. Slide the strip so that these two letters are lined up. You’ll need to use the second “C” on the strip to keep the strip in the badge.
- Start encoding a message! Try “How are you?” The secret message uses letters on the moveable alphabet strip. The first letter of the message is “H”. To encode this letter, find the letter H in the bottom alphabet, and write the letter you find above it, on the strip. In this case, it’s the letter “C”.
- Continue encoding the message, letter-by-letter, making sure not to move the alphabet strip. (If the strip does move, just make the key line up again.) You can check your work at the bottom of the page. [Write this upside down on the bottom of the page: Your final encrypted message is: CJR VMZ TJP?]

Cipher: A code.

Ciphertext:
A coded message.

Cryptography:
Greek word for “secret writing.”
The study of code making and breaking.

Decryption: Decoding a message.

Encryption: Putting a message into code.

Frequency Analysis: A simple code breaking method. It uses knowledge of the frequency of letters in the language of the plaintext message. If “S” is the most frequent letter in English, while “Q” is the most frequent letter in the ciphertext, Q probably stands for S in the code.

Key: A small piece of information needed to complete a code.

Plaintext: A readable message that will be encoded.



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Part II Decode a message

1. To decode the message, you'll reverse how you use the strips. But first, line up the key.

Write "Key: JA. R'V ORWN, CQJWTB." on your paper.

2. As when you encoded the message, you'll need to line up your devices with the key. Line up the J on the moveable strip with the A on the lower alphabet.

3. The secret message letters are on the moveable strip. You move down off the strip to decode the message. The first letter of the coded message is "R". Find it on the strip. What letter is underneath? The first letter of the message is "I". Write I below R on your paper.

4. What should you write below the letter "V"? Check your answer below! [put upside down at the bottom of the page: The correct message is "I'M FINE, THANKS."]



CODE MAKERS FROM HISTORY



Famous people from history invented their own ciphers to communicate important secrets, including Julius Caesar and Thomas Jefferson. The Decoder Badge uses the St. Cyr cipher, a simple substitution cipher named after the French military academy where it was taught in the 1880s. Alphabet B with the key AZ is the atbash cipher, an ancient Hebrew code.

YOUR TURN

Congratulations, you've decoded the message! Now try writing your own message and encoding it. Make sure your message has a key! Trade your encoded messages with a friend, and decode the messages. Now that you've got it, you can also use Alphabet B & C to send and retrieve coded messages!

Part III Decoder Badge – Make your own key strip (Work with a partner on this activity.)

1. Cut out the "Blank Alphabet Strip." Write each letter of the alphabet in a random box to the left of the heavy black line in the center. When you have filled in the entire left side, copy the left side onto the right side in the exact same order.

2. Copy the entire strip so that you and your partner have two identical strips, each consisting of two identical left and right halves.

3. You can now use your decoders to pass messages that only you and your partner can read. Remember to include the key at the beginning of your message!

This activity is from the Oregon Museum of Science and Industry's website at: <http://www.oms.edu>. Visit the Oregon Museum of Science and Industry/1945 SE Water Avenue/Portland, OR 97214-3354

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SECRET DECODER BADGE

To encode (make a secret message):

1. Pick a two-letter key, and line up strip according to key. (If the key is J-A, line up J on the strip with A below it).
2. For each letter in your message, find the letter in the lower row, and write down the letter above it.
3. Pass the message to a friend. Make sure to include the key!

To decode

1. Line up strip according to key. (If the key is J-A, line up J on the strip with A below it.)
2. For each letter of the encoded message, find that letter on the strip. Write down the letter below it.

↑
ENCODER

ABCDEFGHIJKLMNOPQRSTUVWXYZ

DECODE
↓

ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ

ZYXWVUTSRQPONMLKJIHGFEDCBAZYXWVUTSRQPONMLKJIHGFEDCBA

QIEJBDHAVROKXFPWCMLGSNZUYQIEJBDHAVROKXFPWCMLGSNZUY

