

CURIOSITY AT HOME

DECRYPTION DETECTIVE



Encryption is a way of changing information into a coded form, or ciphertext, so that it cannot be understood if intercepted. When done properly, the person you want to be able to read the message should have a method for decrypting (decoding) it, but no one else can easily figure out what type of encryption you used. Can you uncover the secret message encrypted below?

MATERIALS

- Something to write with
- Science notebook or paper

PROCEDURE

- Either print this page, or copy the ciphertexts into your science notebook or on a piece of paper.
- To decode the ciphertexts, find the matching letter in the table below for each number, and copy the letter into the blank above the number. For example, where you see the number 1, you would write the letter A in the blank above it.
- Once you've found all the letters, read them in order to find out the secret message.

23 8 25 4 9 4 20 8 5 3 15 13 16 21 20 5 18 7 15 20 15

20 8 5 4 15 3 20 15 18 ?

2 5 3 1 21 19 5 9 20 8 1 4 1 22 9 18 21 19

Letter	Number
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26



Show us how you're being curious! Share your results with us.



CURIOSITY AT HOME

DECRYPTION DETECTIVE



EXPLORE MORE

- Now, you're going to try and encrypt your own secret messages!
- First, write out your word, phrase, or sentence on a scrap piece of paper. Some suggestions include your name, a favorite animal, or a short sentence about what you did last weekend.
- Go through and replace the letters with their respective numbers to encode your message.
- Lastly, copy the ciphertext onto a fresh sheet of paper, leaving space above each number for someone to write in the right letter.
- Hand your ciphertext off to a friend or family member with the letter/number decryption table. Can they decrypt your secret message?

WHAT'S GOING ON?

In this activity, you were able to decipher the ciphertexts above using the decryption key provided. In this case, the "key" is a table that pairs each letter to a number, but that's not always the case. When you encrypt information, one number or symbol can replace a whole word or phrase. This can make the ciphertext much shorter.

The idea of shortening a word or phrase to a single symbol isn't new: think about ancient Egyptian hieroglyphs or cartouches. Each hieroglyph (character/symbol) represented a word or phrase. Some modern examples of this way of writing include: Chinese hanzi, Japanese kanji, Korean hanja, and Vietnamese Hán tự.



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

DECRYPTION DETECTIVE



K-2 GRADE EXPLORATION

- Describe to someone the steps you used to encrypt secret messages.
- Write another message to send to a friend or family member. This time, try replacing a letter with a different letter. For example, you could take each letter and replace it with the next letter in the alphabet. So, A would encode to B, and B would encode to C. Make sure to provide a new decryption key for your buddy.
- Can you come up with another way to encrypt messages? Come up with your own secret code and teach it to a friend.
- Computers use encryption to send private information to each other. Why might somebody want their data encrypted?



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

DECRYPTION DETECTIVE



3–5 GRADE EXPLORATION

- Write an additional message to send to a friend or family member. This time, try changing your numerical code with a mathematical equation. For example, you could take each number and add two. Then your buddy would have to subtract two before running it through the decryption key. Give your message to your buddy, along with step-by-step instructions on how they can decrypt the message.
- Can you come up with another way to encrypt messages? What could you do to make it harder for someone to decipher your secret messages?
- Computers regularly encrypt data to send to other computers. When might you want your data encrypted?
- Encryption is just one tool that helps keep information safe online. Can you think of any ways you keep your private information safe on the internet?



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER



CURIOSITY AT HOME

DECRYPTION DETECTIVE



6–8 GRADE EXPLORATION

- Write an additional message to send to a friend or family member. This time, try running the number code through a mathematical operation. For example, you could take each number and multiply them by three. Then your buddy would have to divide the numbers in the ciphertext by three before running it through the decryption key. Give your message to your buddy, along with step-by-step instructions on how they can decrypt the message.
- Can you come up with another way to use math to help you encrypt a message? What could you do to make it harder for someone to decipher your secret messages?
- Computers regularly encrypt data to send to other computers. Can you think of any examples of data that might need to be encrypted?
- Encryption is just one tool that helps keep information safe online. What are some other ways to keep private information safe online? Think about both digital tools and offline choices you can make.



Show us how you're being curious! Share your results with us.

PACIFIC
SCIENCE
CENTER

