Virginia 4-H
MAKING the Future

*18 U.S.C. 707

The Science Behind it . . .

What is the difference between a code and a cipher?
A code affects the word, and a cipher affects the individual letters.

Definitions
Cipher — A cipher is a system to make a word or message secret by changing or rearranging the <u>letters</u> in the message. Example: For example: A=G or A=&.

Code — A code is a system of changing <u>entire words or phrases</u> into something else. Codes are not just secret messages, they can be any symbol or signal used to represent, or communicate, something else. Example: President = Eagle or Tank = 4036

Cryptology — Cryptology is the art and science of making and breaking codes.

Codebreaker — A codebreaker is a person who <u>solves</u> secret codes and ciphers without the 'key'.

Codemaker — A codemaker is a person who <u>makes</u> new secret codes and ciphers.

How do you break a cipher?
Breaking a cipher without having the 'key' is difficult. The main tool is the use of a frequency list. Some letters are used more frequently than others in words. The letter used most often is "E" and the least common letter is "Z". The order of letter frequency is: ETAOINSRHDLUCMFYWGPBVKXQJZ.

Replace the frequently used letters in the cipher with the most commonly used letters. Using the frequency list will help to solve the puzzle, then the rest of the letters will need to be tried in different combinations until the message makes sense.

The introduction of computers has made it more difficult to break a cipher.

Materials
⇒ Cipher disk (1 per youth)
⇒ Metal fastener (1 per youth)
⇒ 3 x 5 cards (1 per youth to write their name in code)
⇒ Scissors (to share)
⇒ Pens/Pencils (to share)

Sources
⇒ The Exploratorium: www.exploratorium.edu/ronh/secret/secret.html
⇒ The National Security Agency CryptoKids: www.nsa.gov/kids/home_html.shtml
⇒ Cornell University: www.math.cornell.edu/~mec/2003-2004/cryptography/subs/frequencies.html

www.ext.vt.edu/topics/4h-youth/makers

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