



Encryption

Session 4

Cyber Security boot camp organized by **YELLOW** 



Instructors

- Name
- Job / Company
- Industry Experience
- Something interesting



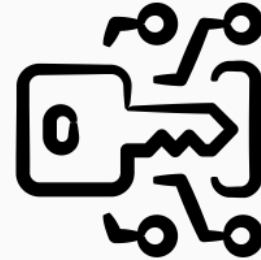
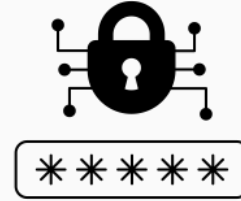
Volunteers

- Name
- Job / School
- Something interesting



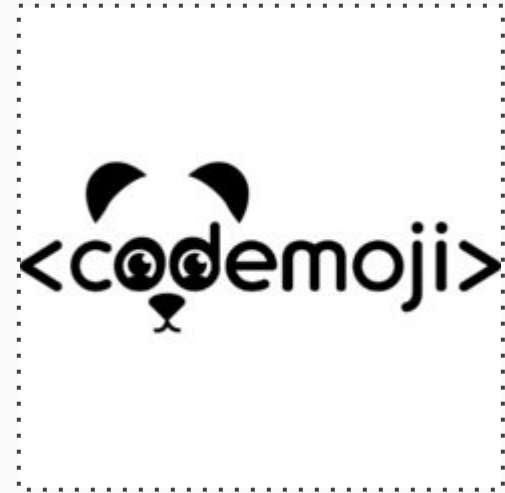
Encryption

- What is encryption?
- Why do we need encryption?
- When is data encrypted?
- How is it encrypted?
- Encoded vs Decoded



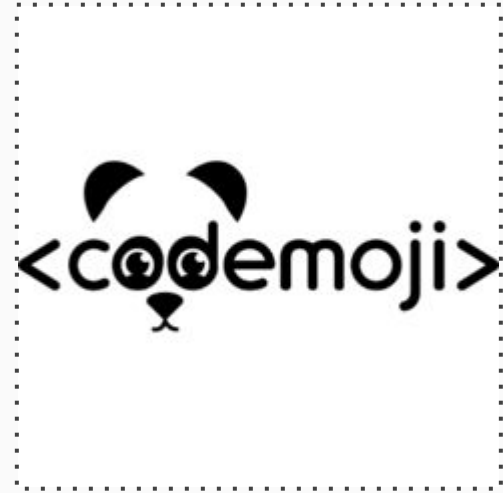
Secret Messages

- Student can use cell phones / laptops
- Send a secret message
- <https://codemoji.org>



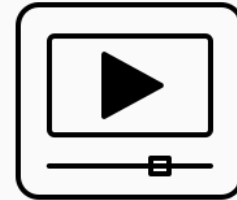
Secret Messages

- Encrypted message
- Need a key to make it readable




History: Mary Queen of Scots Cipher

- Discuss: Codes (ciphers) has been used to keep messages secret
- Lets watch it:
 - https://www.youtube.com/watch?v=_htopuN4pCk
 - *Teacher materials: video-4.1*
- Discuss with students



Simple encryption with Binary

- Pass binary encryption worksheets
- Create a secret word using binary
- Pass the sheet to someone else
- Time to decrypt the word
- Use table to decrypt
- Keep your words respectable

 **Encryption with binary**

Although it is not very secret, binary numbers are a code. (Why do you think they call it 'coding'?). To give you practice encoding and decoding a message, use this Unicode chart for the upper case letters as a cipher strip. For example, the word "HELLO" can be coded as:

10010001000101100110010011001001111


Decoding:
Each letter above uses seven digits. Circle the digits for each letter, look up the number in the chart, and write the letter beneath the number.

Encoding:
Write a word here that is at least 5 and no more than 8 characters

Using the table, write out the word on a separate piece of paper. Have your partner check that you correctly encoded your work.

Give your paper to another member of your class. Challenge them to decode it.

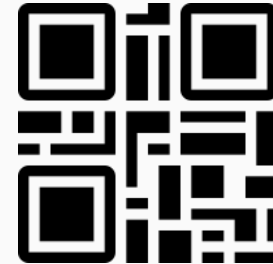
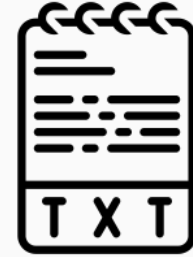
A	1000001
B	1000010
C	1000011
D	1000100
E	1000101
F	1000110
G	1000111
H	1001000
I	1001001
J	1001010
K	1001011
L	1001100
M	1001101
N	1001110
O	1001111
P	1010000
Q	1010001
R	1010010
S	1010011
T	1010100
U	1010101
V	1010110
W	1010111
X	1011000
Y	1011001
Z	1011010

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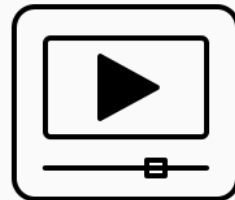
Different ways

- Goal is to go from plaintext to ciphertext
- Encryption algorithms
- Encryption keys
- Symmetric Encryption
- Asymmetric Encryption

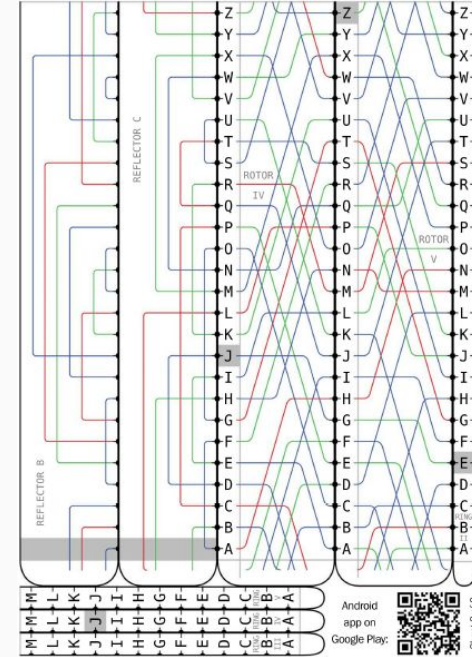
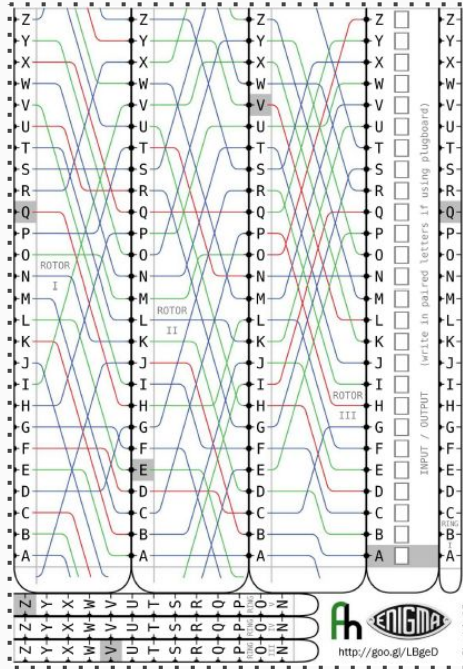


Enigma in Pringles Can

- Automating the encryption/decryption at home
- Using a Pringles can to make an Enigma machine
- Lets watch it:
 - <https://www.youtube.com/watch?v=pZsuxZXN33g>
 - *Teacher materials: video-4.2*
- Summer craft




Enigma Sheets



Cipher Strips

- Pass cipher strips sheets / worksheet
- Creating keys by moving characters
- Make a harder key
- Write down key method
- Encrypt a simple sentence

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Cipher Strips

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A B C D E F G H I J K L M

A B C D E F G H I J K L M

A B C D E F G H I J K L M

A B C D E F G H I J K L M


A B C D E F G H I J K L M

A B C D E F G H I J K L M

A B C D E F G H I J K L M

A B C D E F G H I J K L M

A B C D E F G H I J K L M

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Create your own cipher


Student worksheet 2 / Create your own cipher


- With a partner, invent your own cipher for the upper case letters in the Alphabet.
- Using the provided Cipher Strips, create your own cipher wheel by:
 - Moving the letters to left or right (decide how many letters)
 - Assign different Cipher Strip to different location in string
 - Invent your own symbols
 - Let your imagination fly
- Write down your key in the space below. Your key can be instruction for moving left or right on a cipher strip, or it may be a cipher strip itself, it can be first letter of sentence using strip 1, second uses strip 2, or any combination.

Key to encode	Key to decode

- Encode a short sentence based on encoding rules
- Decode the same sentence based on the decoding rules
- If you are having problems, study your keys and figure out how to fix them

(Optional - Time permitting): Encode a question, and give it to another pair of students with your keys. Now decode the message and answer the message using your key.

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Session 4 - Encryption

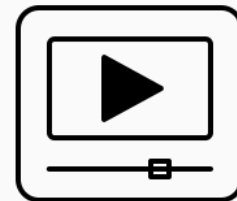
Modern Encryption

- Using PKI
- How are keys exchanged
- Private key to decrypt
- Public key to encrypt



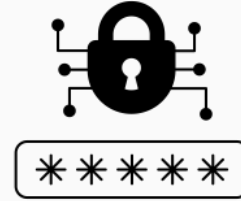
Movie Trailer - The Imitation Game

- All about decoding messages using technology
- Lets watch it:
 - <https://youtu.be/S5CjKEFb-sM?t=18>
 - *Teacher materials: video-4.3*
- Good movie to watch over summer
- Discuss with students



What we learned...

- Encryption / Decryption
- Ciphers / Codes / Keys
- Protecting data / documents



How are we doing?

- Pass survey sheet
- Students:
 - Fill in Session #
 - Circle room #
 - Answer questions
- Volunteers to collect surveys



This is end of session 4

- This is end of day one of boot camp
- Don't forget to bring:
 - Backpack
 - Badge / Name Tag
 - Raffle Tickets
- Meet in Cafeteria at 8:30 am tomorrow
- Prizes, giveaways : tomorrow at 3:15pm

