

OPERATION CODE CRACKER

MISSION DETAILS: BEFORE YOU ARRIVE



Top secret

MEMORANDUM

eyes only

TO: Recruits (AKA Students) and Handlers (AKA teachers and chaperones)
FROM: HQ
RE: *OPERATION CODE CRACKER*

We are looking forward to your infiltration of The International Spy Museum on for *Operation Code Cracker*.

PRIOR TO ARRIVAL:

- 1) If you have booked more than one workshop, please know which students will attend each workshop prior to arrival. This will allow us to move your students through the museum more efficiently.
- 2) Divide your students attending each Operation Code Cracker workshop into 4 teams – ALPHA, BRAVO, CHARLIE, DELTA– each team will need an adult chaperone.
- 3) Distribute pages 3 to 8 to each student attending the program at least one day prior to the program and encourage them to complete the short cipher wheel activity, practice the mathematical formulas, and review the vocabulary. You can also do this with the class as a whole.

WHEN YOU ARRIVE:

You will be greeted in the Lobby, and then escorted up to our 4th floor classroom.

Your students will be asked for the secret code word (as determined by the pre-visit activity).

Once cleared for access: *Operation Code Cracker* will begin. The program will consist of a 60 minute workshop.



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MEMORANDUM

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TO: Students AKA RECRUITS
FROM: HQ
RE: *OPERATION CODE CRACKER*

Recruits – you are being called to Headquarters for a very important spy mission. The details of **Operation Code Cracker** are too sensitive and must remain classified until you arrive at **HQ**. You are on a need to know basis.

To attain clearance to participate in this **TOP SECRET** mission – you will need to say the following password to our operatives when you arrive:

EQT VJUT BJGU PF TKPRLX

Having trouble pronouncing the words above?! Use your cipher wheel to decipher the message

THE KEY is A=X – good luck!

BRING YOUR CIPHER WHEEL WITH YOU!

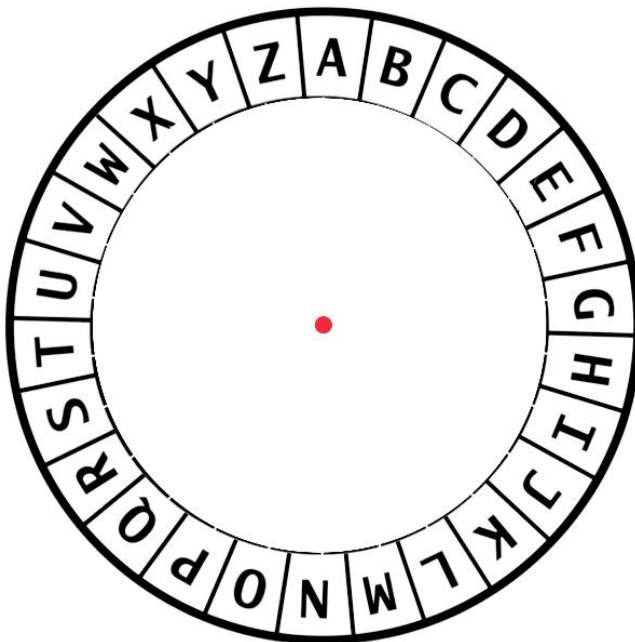


MISSION TOOL: MAKE YOUR OWN CIPHER WHEEL

- Copy this page onto cardstock or thick paper.
- Carefully cut out both disks.
- Place the smaller circle on top of the larger circle.
- Use a paper fastener (brad) to attach the inner disk to the outer disk. Push it through the middle of both disks and then bend out the tabs underneath the disks.

You are now ready to decipher your message!

The key for this mission is **A=X**. Rotate the inner disk until X lines up with the A on the outer disk. Find each letter in your message on one wheel and look on the other wheel to find the **cipher** letter. To encipher messages do the reverse.





MISSION TOOL: MATHEMATICAL PRE-MISSION PREPARATION

As part of *Operation Code Cracker* you will need to know how to convert fractions into percentages.

Here's how:

The top number (numerator) is divided by the bottom number (denominator) then multiplied by 100
 (numerator \div denominator \times 100 = xx%)

So for example: $\frac{1}{2} \Rightarrow 1 \div 2 = 0.5 \quad 0.5 \times 100 = 50\%$

$\frac{1}{4} \Rightarrow 1 \div 4 = 0.25 \quad 0.25 \times 100 = 25\%$

Try this: $\frac{3}{10} \underline{\quad} \div \underline{\quad} = \underline{\quad} \quad \underline{\quad} \times 100 = \underline{\quad}$

$\frac{6}{15} \underline{\quad} \div \underline{\quad} = \underline{\quad} \quad \underline{\quad} \times 100 = \underline{\quad}$

MISSION TOOL: Frequency Analysis

You will also need to know how to conduct **frequency analysis** to decipher messages. Frequency analysis involves examining a message to determine the letter or symbol that appears most frequently. Here are some important rules when looking to decipher something into the English language:

E is the most common letter used in words. Other common letters (in order): **T, A, O, N, I, R, S, H**

Least commonly used letters: **J, K, Q, X, Z**

Common double letter combinations: **EE, OO, LL, TT, SS**

Some common two letter combinations: **EN, RE, ER, TH**

The only one letter words: **A & I**

More about the letter **A**: Often found at the beginning of the words and second from the last letter

More about the letter **I**: Often found third from the last letter of a word (think...ing)

Commonly used words: **The, That, And, Will, A, I, Is, It, In**

Code Cracker Challenge:

Keeping these rules in mind, use your cipher wheel to decipher the following message – without knowing the key:

Y K N F N N Y J E L J Z R Y E D D E

The Key is A = _____



MISSION TOOL: THE LANGUAGE OF ESPIONAGE

Are you ready to enter the shadow world of spying? The world of espionage and spying has its own language. Additionally, the world of codes and ciphers must also be revealed before you can commence Operation Code Cracker. Take a look at these words, know them before you come:

ULTRA: CODENAME FOR ALL ALLIED CODEBREAKING ACTIVITIES DURING WWII.

BOMBE: POLISH ELECTRO-MAGNETIC DEVICE CREATED TO DECIPHER 3 ROTOR ENIGMA COMBINATIONS, EARLY PRECURSOR TO THE MODERN COMPUTER.

BONA FIDES: proof of a person's claimed identity.

CASE OFFICER: a staff officer who manages agents and runs operations.

CIPHER: SYSTEM FOR DISGUIISING A MESSAGE BY REPLACING ITS LETTERS WITH OTHER LETTERS OR NUMBERS, OR BY SHUFFLING THEM.

CODE: SYSTEM FOR DISGUIISING A MESSAGE BY REPLACING ITS WORDS WITH GROUPS OF LETTERS OR NUMBERS.

CODEBOOK: LIST OF PLAIN LANGUAGE WORDS OPPOSITE THEIR CODEWORD OR CODENUMBER EQUIVALENTS.

COLOSSUS: ELECTRONIC DEVICE THAT HELPED SOLVE GERMAN CRYPTOGRAMS.

CRIB: PASSAGE OBTAINED BY GUESSING A WORD IN A CODED MESSAGE THAT MAY SOLVE ANOTHER.

DEAD DROP: A SECRET LOCATIN WHERE MATERIALS CAN BE LEFT FOR ANOTHER PARTY TO RETRIEVE.

UNLOADING A DEADROP IS WHEN THE MATERIALS ARE TAKEN OUT BY THE OTHER PARTY.

KISS: TWO IDENTICAL MESSAGES ENCRYPTED IN DIFFERENT WAYS BUT WITH MATCHING PLAINTEXT SO THAT THE SOLUTION OF ONE GAVE THE PLAINTEXT OF THE OTHER, PROVIDED KEY TO ENIGMA SETTINGS.

MOLE: AN AGENT OF ONE ORGANIZATION SENT TO PENETRATE A SPECIFIC INTELLIGENCE AGENCY BY GAINING EMPLOYMENT

NSA: National Security Agency; branch of the U.S. Department of Defense responsible for ensuring the security of American communications and for breaking into the communications of other countries; "No Such Agency."

ONE-TIME PAD: SHEETS OF PAPER OR SILK WITH STRINGS OF RANDOM NUMBERS FOR SINGULAR USE AS A KEY IN ENCIPHERING MESSAGES.

PLAINTEXT: ORIGINAL MESSAGE BEFORE ENCRYPTION.

PURPLE: AMERICAN NAME FOR JAPANESE DIPLOMATIC CIPHER MACHINE USED FROM 1939-1945.

RED: AMERICAN NAME FOR AN EARLY JAPANESE DIPLOMATIC CIPHER MACHINE.

ULTRA: codename for all Allied code breaking activities during WWII.

STEGANOGRAPHY: TECHNIQUES FOR CONCEALING THE VERY EXISTENCE OF A MESSAGE (SECRET INKS OR MICRODOTS).