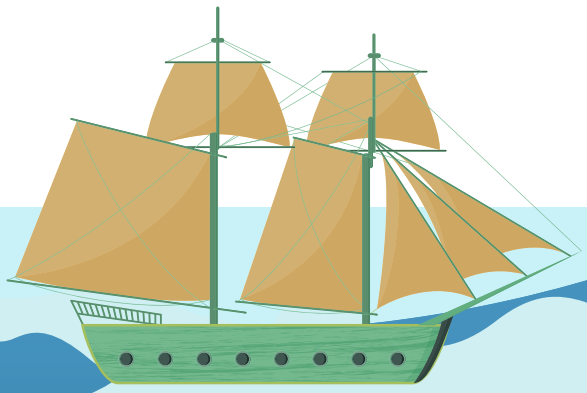
JUNIOR SAILOR

CODES AND CIPHERS

Did you know we use codes every day? Even something as simple as a special handshake with a friend or text shorthand (ex: LOL) is a code! Codes can be used to hide a secret message, to say something in an easier way (texting) or to send messages across long distances (Morse code). Codes have always been important in history and they can be the key to winning or losing important battles.

The Battle of Midway

During World War II, the United States and its allies fought the war on two fronts: the land battles of Europe and the aerial and naval battles of the Pacific. The U.S. Navy was integral to the Pacific war front, primarily fighting against Japan. Throughout the war, Navy code breakers worked to break the codes and read the messages of the Japanese Navy.



In 1942, the Japanese Navy was preparing to attack the U.S.-held island of Midway. The Japanese hoped to gain control of Midway and use this base to weaken American naval power. Meanwhile, naval code breakers based in Pearl Harbor, Hawaii were monitoring the Japanese communications about this planned attack. The Japanese codes referred to “AF” as the location for the big attack. The code breakers, led by Captain Joseph Rochefort, were convinced AF was Midway. To be sure of the attack’s location, the codebreakers sent a false message, using a code they knew the Japanese had already broken, indicating that Midway was in need of fresh water. Shortly after, the Japanese messages transmitted news of a fresh water shortage at AF! This confirmed that Midway was the location of the upcoming attack.

Captain Joseph Rochefort, Commander of Station HYPO, the cryptographic intelligence unit at Pearl Harbor

Not only did the American code breakers establish the location of the Japanese attack, they also figured out the planned locations of the Japanese fleet and the date and time they would attack. This allowed Navy leadership to plan for the attack and prepare their own counterattacks against the Japanese. When the Japanese arrived at Midway on June 4, the U.S. Navy was ready and they attacked with gusto. The Battle of Midway was a major victory for the United States and marked the key turning point for the war in the Pacific. For the rest of the war, the Japanese Navy remained on the defensive. For their invaluable contribution to the Battle of Midway, the Navy code breakers were awarded medals by the President..

Naval aviators during the Battle of Midway, 4 June 1942

The Substitution Code

There are many ways to conceal or encode messages. One method is substitution, where each letter of a message is substituted with another number, letter, or symbol. Let's try an easy form of substitution.

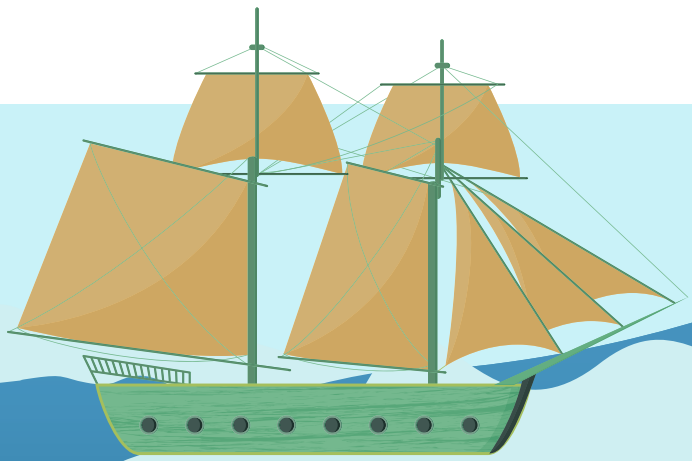
Decipher the following message:

20 8 5 # 2 1 20 20 12 5 # 15 6 # 13 9 4 23 1 25 # 23 1 19 # 1 # 20 21 18 14 9 14 7 # 16 15 9 14 20 # 9 14 # 20 8 5 # 23 1 18 #

If you have trouble, think about the commonly occurring patterns in the code ("20 8 5" is repeated twice). What's a common three-letter word that is often repeated? You can also think about what letters appear most commonly in the English language. E is the most common letter and T is the second most common.

Still need help? Here are some hints:

= space A = 1 Y = 25



The Caesar Cipher

Tools can make it easier to encode and decipher messages. One tool used for substitution codes is the Caesar Shifter or Caesar Cipher. This cipher works by shifting the letters of the alphabet ahead a few letters. During WWII, naval code breakers used a more complex version of the Caesar Cipher called the M-209 Encoder Machine. To encipher a message, sailors adjusted the six “key wheels” on the front of the machine to create the key. They then used the “indicator disk” on the left side of the machine to turn each letter of the message. Because the M-209 key wheels give a random key, it was important that the sailor’s recipient also receive the key settings.

Create your own Caesar Cipher

1. Print and cut out the Caesar Cipher circles on the following page.
2. Place the smaller circle on top of the larger one and join with a paper fastener.
3. Write your secret message in plain text.

a. Example: Cryptology is really cool.

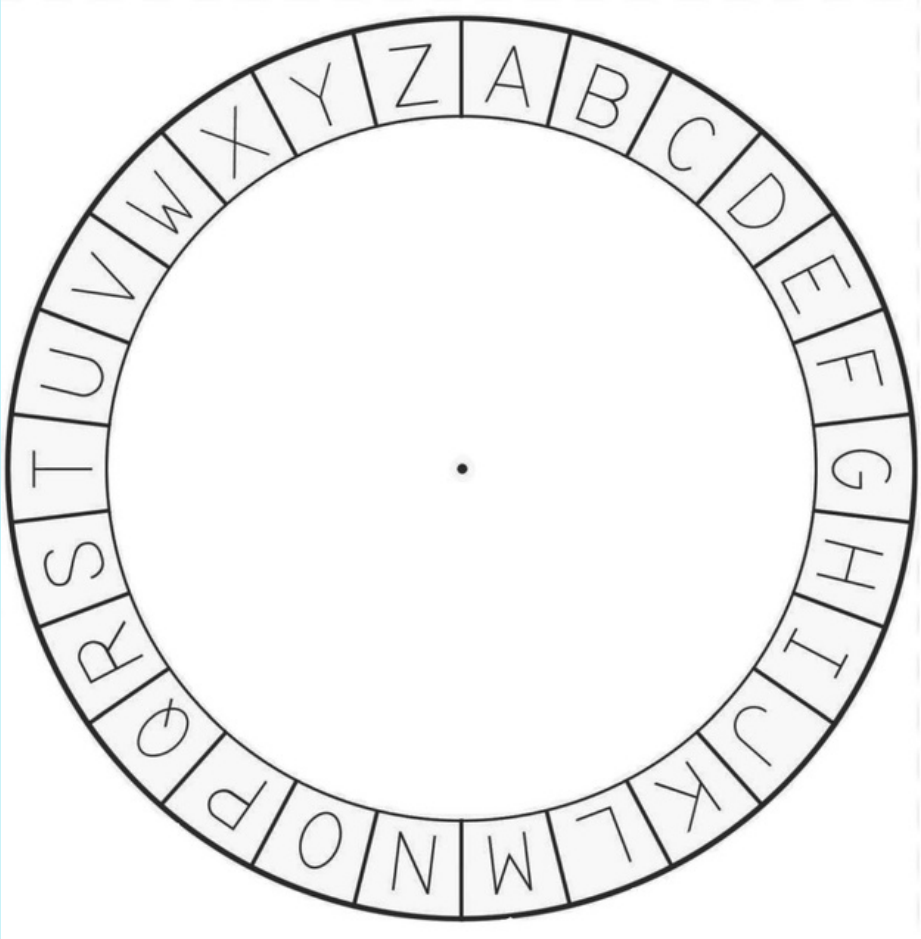
4. Choose a number from 1 to 25. This is your key. Turn the smaller circle that number of spaces.

a. Example: 25 spaces

5. Encode your message by replacing the letters from the large circle (the plain text) with the letters from the small circle (the ciphered text).

a. Example: XIBKGLOLTB # RH # IVZOOB # XLLO

6. Give your encoded message to a friend and see if they can break the cipher! Or give your friend the key and pass secret messages back and forth using the same key.


A
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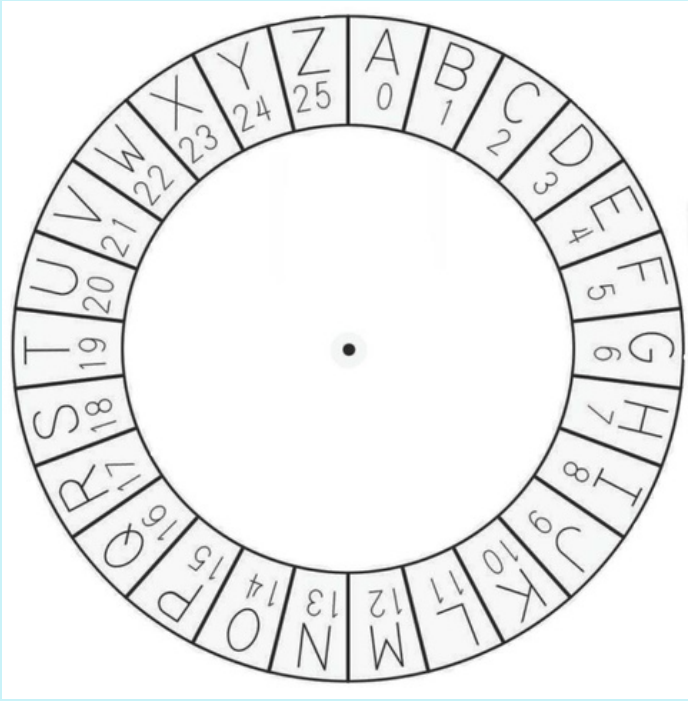
A 0
B 1
C 2
D 3
E 4
F 5
G 6
H 7
I 8
J 9
K 10
L 11
M 12
N 13
O 14
P 15
Q 16
R 17
S 18
T 19
U 20
V 21
W 22
X 23
Y 24
Z 25