



SPIES,  
**SECRET MESSAGES,**  
**THE INTERNET**  
&  
**YOU**

Issue  
#4

KNOWLEDGE  
IS  
PRICELESS

The names Dog...  
*Sodium Dog.*





WE'RE HERE TO TEACH  
ABOUT CODES  
AND CYPHERS!



# SCYTALE CYPHER





SCYTALE CYPHER IS FROM ANCIENT SPARTA.

SCYTALE MEANS BATON IN GREEK.

A STRIP OF PAPER IS WRAPPED AROUND THE SCYTALE AND ENCRYPTED BY WRITING CHARACTERS ACROSS THE PAPER.

THE ENCRYPTION KEY IS THE NUMBER OF CHARACTERS THAT CAN BE WRITTEN IN ONE ROUND OF THE SCYTALE.

FOR EXAMPLE, WHEN "THIS-IS-A-SECRET-MESSAGE" IS ENCRYPTED WITH 4 CHARACTERS PER ROUND:

PLACE THE CHARACTERS ACROSS THE STRIP OF PAPER:

	T	H	I	S	-	I	
S	-	A	-	S	-	E	
C	R	E	T	-	-	M	
E	S	S	A	G	-	E	

IT IS ENCRYPTED BY UNWINDING THE PAPER FROM THE SCYTALE.

TSCEH-RSIAESS-TA-S-GIEME



# **CAESAR**

# **CYPHER**





THE CAESAR CYpher ENCRYPTS BY REPLACING CHARACTERS IN THE TEXT WITH OTHER CHARACTERS. REPLACEMENT IS PERFORMED BY SHIFTING LEFT OR RIGHT AMONG THE LETTERS OF THE ALPHABET.

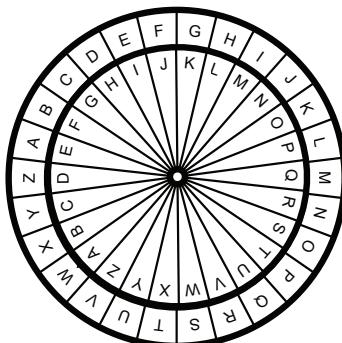
'N'

FOR EXAMPLE, SHIFTING 13 CHARACTERS, 'A' IS ENCRYPTED TO AND 'Z' IS ENCRYPTED TO 'M':

Plain: abcdefghijklmnopqrstuvwxyz

Cipher: nopqrstuvwxyzabcdefghijklm

THIS IS SOMETIMES CALLED ROT-13.



YOU CAN USE TWO DISKS (SEE BACK OF BOOK) ARRANGED ONE INSIDE THE OTHER FOR CREATING YOUR OWN VERSION OF THE CAESAR CYpher CONFIGURED SO THAT 'A' BECOMES 'E', THE WORD 'FISH' WOULD BECOME 'JMWL'.

CAESAR CYphERS ARE EASY TO USE AND IMPLEMENT. YOU CAN USE THEM TO SEND SECRET MESSAGES TO YOUR FRIENDS. BUT THEY CAN BE EASY TO DECYpHER. HOWEVER, THEY'RE STILL FUN AND HAVE A LONG HISTORY ASSOCIATED WITH THEM!

# **WHO ARE YOU REALLY?**



WHEN TWO  
COMPUTERS  
START TALKING  
TO EACH OTHER  
WE USED TO  
SAY THAT THEY  
HANDSHAKE



NOW, TO PRE-  
VENT SPREADING  
VIRUSES, THEY  
FISTBUMP IN-  
STEAD



IT'S IMPORTANT ON THE INTERNET TO  
STAY SAFE.

BUT HOW CAN YOU BE SURE THAT THE  
WEBSITE YOU'RE CONNECTING TO IS WHO  
THEY SAY THEY ARE?

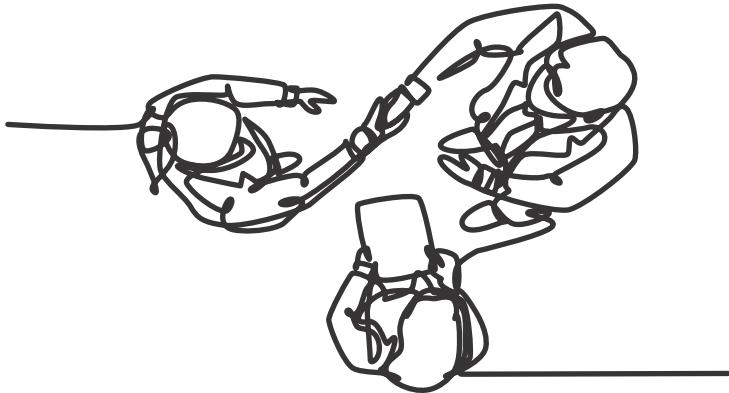
IN THE MIDDLE AGES, THEY HAD A SIMI-  
LAR PROBLEM -- TRADERS TRAVELLING TO  
NEW COUNTRIES NEEDED A WAY TO  
TRAVEL WITHOUT CARRYING LOTS OF  
GOLD WITH THEM.  
THEY COULD GET A LETTER OF CREDIT  
FROM A BANK WHICH ESTABLISHED WHO  
THEY WERE AND THEIR BANK ACCOUNT.

HOWEVER, BAD  
ACTORS WOULD  
TRY TO FORGE  
LETTERS FROM  
A BANK TO  
STEAL MONEY.



IN ORDER TO PREVENT THIS FROM HAP-  
PENING, THE BANKS WOULD EITHER  
PROVIDE "PASSWORDS" OR OTHER SECRETS  
OR SEND A NOTICE THAT THE BEARER WAS  
TO BE TRUSTED BY WAY OF A TRUSTED  
THIRD PARTY.  
ON THE INTERNET THESE ARE CALLED  
CERTIFICATE AUTHORITIES.

# **CHAIN OF TRUST**



THE INTERNET TODAY USES A CHAIN OF TRUST IN ORDER TO VALIDATE THAT A WEBSITE IS WHO THEY SAY THEY ARE IN A BROWSER. YOU CAN SEE THAT A WEBSITE IS WHO THEY SAY THEY ARE WHEN A LOCK IS DISPLAYED IN THE LOCATION BAR.



TRUST  
BUT  
VERIFY



# PASSWORDS

## GOOD PASSWORDS:

- \* LONGER IS BETTER
- \* REMEMBERABLE
- \* A MIXTURE OF CAPITAL & LOWERCASE LETTERS, NUMBERS, AND SPECIAL CHARACTERS
- \* SOMETH1NG-LIKE-THIS!
- \* I71K3LON6P@55WORD5!!!
- \* PENCIL+PENS+PAPER?

## BAD PASSWORDS:

- \* SHORT
- \* NO VARIETY
- \* CONTAINS "PASSWORD"
- \* YOUR NAME, BIRTHDAY, OR ADDRESS
- \* YOUR PET'S NAME
- \* WORD123
- \* TOPSECRET
- \* SODIUM
- \* 12345
- \* QWERTY
- \* ILOVEYOU
- \* SUPERMAN
- \* ABCD1234



# **OTHER CODES**

&

# **CYPHERS**



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              w  
 T    U      X    Y  
 V              Z

### SECRET ALPHABETS

### BRAILLE ALPHABET FOR THE BLIND

#### Braille Alphabet

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	1	2	3	4
5	6	7	8	9	0	.	,	:	
/	?	!	@	#	+	-	*	"	"
'	<	>	(	)	capital	and	letter	number	
o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o

A B C D E F G H I J  
 K L M N O P Q R  
 M M M M M M M M  
 모 편 산 월 월 월  
 YY Δ

hint: A =   
B =   
C =

### ANOTHER SECRET ALPHABET

ALFA BRAVO CHARLIE  
 DELTA ECHO FOXTROT GOLF  
 HOTEL INDIA JULIETT KILO LIMA  
 MIKE NOVEMBER OSCAR PAPA  
 QUEBEC ROMEO SIERRA TANGO  
 UNIFORM VICTOR WHISKEY  
 X-RAY YANKEE ZULU

### MORSE CODE TELEGRAPHHS AND RADIO

#### International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.

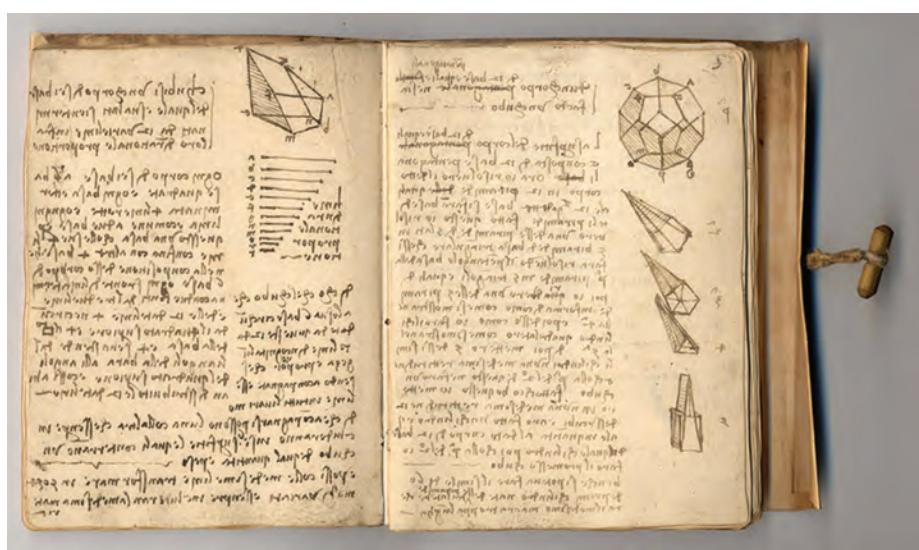
A . - . .  
 B - - . . .  
 C - - - .  
 D - - - - .  
 E .  
 F - - - - - .  
 G - - - - - - .  
 H . . . .  
 I . .  
 J . - - - - .  
 K - - . .  
 L - . - .  
 M - - .  
 N - - - .  
 O - - - - .  
 P - - - - - .  
 Q - - - - - - .  
 R - - - - - - - .  
 S - - - - - - - - .  
 T - - - - - - - - - .

U . . - - .  
 V . . . - - .  
 W . . . . - - .  
 X . . . . . - - .  
 Y . . . . . . - - .  
 Z . . . . . . . - - .

1 . - - - - - - - - - - .  
 2 . . - - - - - - - - - .  
 3 . . . - - - - - - - - .  
 4 . . . . - - - - - - - .  
 5 . . . . . - - - - - - .  
 6 . . . . . . - - - - - .  
 7 . . . . . . . - - - - - .  
 8 . . . . . . . . - - - - .  
 9 . . . . . . . . . - - - .  
 0 . . . . . . . . . . - - .

# BACKWARDS WRITING

LEONARDO DA VINCI, AN ITALIAN ARTIST AND SCIENTIST, USED MIRRORED WRITING IN HIS JOURNALS. IT'S NOT KNOWN IF IT WAS TO ENCODE THE JOURNALS OR IF HE WAS LEFT HANDED AND WRITING RIGHT TO LEFT WOULD KEEP THE INK FROM SMEARING. EITHER WAY, WRITING BACKWARDS IS ANOTHER WAY TO OBSCURE YOUR MESSAGES.



# **ONE TIME USE PADS**

ONE TIME USE PADS ARE A TYPE OF UNBREAKABLE ENCRYPTION/CYPHER.

IN ORDER FOR IT TO WORK, YOU NEED TO HAVE A SHARED PAD OR SECRET, WHICH IS USED TO ADD "RANDOMNESS" TO YOUR MESSAGE, BUT THE RECIPIENT CAN DECRYPT THE MESSAGE USING THEIR SHARED SECRET.

THIS IS A SIMPLE EXAMPLE OF THIS CODE.



FOR THE PADS, WE'LL USE 2 DECKS OF CARDS, RED AND BLUE.  
1. SHUFFLE THE BLUE DECK  
2. PUT THE RED CARDS IN THE SAME ORDER.  
3. GIVE THE RED DECK TO A FRIEND.

TO ENCRYPT YOUR MESSAGE:

1. WRITE OUT THE WORDS. REMOVE PUNCTUATION
2. GROUP LETTERS INTO GROUPS OF 5. PAD WITH 'X' TO MAKE A COMPLETE SET. "MARY HAD" BECOMES "MARY HAXXX"
3. FOR EACH LETTER DRAW THE TOP CARD OFF OF THE BLUE DECK. USE THE TABLE ON THE NEXT PAGE TO DETERMINE WHICH LETTER TO ENCRYPT TO. IF YOUR LETTER WAS 'B' AND YOU DREW A '2', THEN THE LETTER WOULD BE 'D'.

TO DECRYPT, USE THE RED DECK.

1. DRAW THE TOP CARD IN THE DECK; USE IT TO FIND THE CORRECT COLUMN.
2. FIND THE CORRECT ROW, THEN WRITE DOWN THE LETTER TO THE LEFT OF THE ROW. REPEAT FOR EACH ENCRYPTED LETTER.

Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	I	G	F	E	D	C	B	A		Letter	1												
A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	I	G	F	E	D	C	B	A		2												
B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		3												
C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		4											
D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	K	H	G	F	E	D	C	B	A		5										
E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		6									
F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		7								
G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		8							
H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		9						
I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		10					
J	I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		Q				
K	J	I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		K			
L	K	J	I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		Q		
M	L	K	J	I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		Q	
N	M	L	K	J	I	H	G	F	E	D	C	B	A	Z	Y	X	W	V	U	T	S	R	O	P	O	N	M	L	K	J	H	G	F	E	D	C	B	A		K

# A N D C Y P H E R S M O R E C O D E S

MECHANICAL CODES USE MACHINERY TO PERFORM ENCRYPTION. THE ENIGMA CODE FROM WORLD WAR II IS AN EXAMPLE.



SODIUM THINKS THAT STEGANOGRAPHY IS WRITING ABOUT STEGOSAURUSES. IT'S REALLY A WAY TO HIDE TEXT INSIDE A PICTURE OR OTHER TEXTS.



TRANSPOSITION CODES, SUCH AS ANAGRAMS OR RAIL FENCE CYPHERS, MODIFY THE ORDER OF THE LETTERS. "ARS MAGNA" IS AN ANAGRAM OF "ANAGRAM". THE SCYTALE CYPHER IS ALSO A TYPE OF TRANSPOSITION CODE.

PUBLIC AND PRIVATE KEY ENCRYPTION USE SHARED SECRETS IN ORDER TO ENCODE/-DECODE MESSAGES. A PUBLIC KEY CAN BE USED BY ANYONE TO ENCRYPT A MESSAGE, BUT THE PRIVATE KEY IS NEEDED TO DECRYPT. THE INTERNET USES THIS FORM OF ENCRYPTION EXTENSIVELY.

# **RESOURCES**

- \* Writing Secret Messages in Color : 4 Steps (with Pictures) - Instructables - <https://www.instructables.com/Writing-Secret-Messages-in-Color/>)
- \* Secret Language: Cryptography & Secret Codes | Exploratorium - <https://exploratorium.edu/ronh/secret/secret.html>)
- \* Cryptography Tutorial - <https://www.tutorialspoint.com/cryptography/index.htm>)
- \* Cryptology for Beginners - <https://mastermathmentor.com/mmm/content/files/crypt/Ciphering%20manual.pdf>)
- \* International Spy Museum - Washington DC - <https://www.spymuseum.org/>)
- \* Frode Weierud's CryptoCellar - <https://cryptocellar.org/>)
- \* Secret Language: Cryptography & Secret Codes | Exploratorium - <https://exploratorium.edu/ronh/secret/secret.html>)
- \* Schneier on Security: The Solitaire Encryption Algorithm - <https://www.schneier.com/academic/solitaire/>
- \* Encoding & Decoding Online Tools - DenCode - <https://dencode.com/>
- \* Scytale Cipher Encrypter / Decrypter, Encoder / Decoder, Solver, Translator Online - DenCode - <https://dencode.com/en/cipher/scytale>
- \* nsa scytale directions.pdf - chrome-extension://mhjfbmdgcfjbbpaeojfjohoejehjai/index.html
- \* The Skytale: An Early Greek Cryptographic Device Used in Warfare : History of Information - <https://www.historyofinformation.com/detail.php?id=4168>

# **ALTHEA SEILHAN**

## ILLUSTRATION

ALTHEA LIVES IN COLUMBUS, OH, WITH HER PARENT AND 4 CATS. SHE HAS BEEN MAKING ART ALL HER LIFE. SHE IS A SECOND DEGREE BLACK BELT IN TANG SOO DO. SHE IS ALSO A BEGINNING COSTUME MAKER. IN 2016, SHE WON A S.P.A.C.E. AWARD FOR HER FIRST COMIC, "STARCATCHER'S QUEST".



Althea's cat.

# **MATT WILLIAMS**

## WRITING & LAYOUT

MATT LIVES IN COLUMBUS, OH, IN A HOUSE FILLED WITH CATS AND YARN.

IN HIS SPARE TIME HE ENJOYS DESIGNING TABLETOP GAMES, READING, WEAVING, COFFEE, AND SPENDING TIME WITH ALTHEA. HE WANTED TO BE A RENAISSANCE PERSON WHEN HE WAS YOUNG. MAYBE SOMEDAY HE'LL ACHIEVE THIS GOAL!

