TRIFID CIPHER

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Introduction

The Trifid cipher has been invited around 1901 by the Frenchman Felix Delastelle. He was born in 1840 and died in 1902. After leaving school in Saint-Malo he worked in the local harbor the following 40 years. He wrote a book titled *Traité Élémentaire de Cryptographie*.

Example – Encryption

Three layers in the form of tables are given:

Layer 1	1	2	3
1	B	V	U
2	S	X	I
3	H	O	Y

Layer 2	1	2	3
1	C	?	F
2	J	T	W
3	R	N	A

Layer 3	1	2	3
1	E	Z	L
2	K	D	G
3	M	P	Q

We encrypt the word TOPSECRET.
We find the letter **T** in layer 2, column 2, row 2. We note these three numbers vertically one below the other. Now we look for the letter **O** in the tables. In this case, we get the result 1 2 3 for layer 1, column 2, row 3. In layer 3, column 2, row 3 we find the next letter **P**.

Example – Encryption

The remaining letters are coded with numbers in the same way. All columns are gathered from left to right.

T	O	P	S	E	C	R	E	T
2	1	3	1	3	2	2	3	2
2	2	2	1	1	1	1	1	2
2	3	3	2	1	1	3	1	2

The encryption works as following: The first horizontal group of three letters is 213. Looking at layer 2, column 1, row 3, we find the letter **R**. The next three numbers are 132 and result in the letter **I**. Working your way through the remaining numbers from left to right and from top to bottom, the ciphertext is RIWTBSACK.

Example – Decryption

At first we note down the layer, column, and row of each letter in
the ciphertext.

R	2	1	3
I	1	3	2
W	2	3	2
T	2	2	2
B	1	1	1
S	1	1	2
A	2	3	3
C	2	1	1
K	3	1	2

Example – Decryption

The number triples of the first $9/3 = 3$ letters from slide 5 are now arranged in the first row and so on:

2	1	3	1	3	2	2	3	2
2	2	2	1	1	1	1	1	2
2	3	3	2	1	1	3	1	2

Note that it is not necessary to finish a row right after a triple. Now we form groups of three numbers from left to right. Reading the numbers column-wise we get, at first, the triple 222 which means that we need to look in layer 2 and at column 2, row 2. Therefore, the first plaintext letter is T.

Challenge

The two retired professors Readsalot and Speakslittle from England send each other messages encrypted with the Trifid cipher. The key consisting of the three layers has been previously exchanged and is known to both. Professor Speakslittle receives a ciphertext from his colleague Readsalot. Due to his absentmindedness, Professor Speakslittle has lost the layer 2.

Can Professor Speakslittle recover the plaintext despite of the missing layer?

Layer 1	1	2	3
1	A	P	I
2	Y	K	X
3	J	O	G

Layer 2	1	2	3
1			
2			
3			

Layer 3	1	2	3
1	F	U	S
2	Q	D	R
3	C	Z	?

Challenge

Professor Speakslittle asks for help with the encryption.
To solve the challenge, follow these steps:

1. Find the nine missing letters of the Latin alphabet for layer 2 and put them in the correct order.

2. Form blocks of three numbers and note down the correct letters of the plaintext.

3. Use the fifteenth word of the plaintext as the solution. Hand it in using only capital letters.

Ciphertext

EMKE MEWAM OF YTDDC GFTY LYEWIG
KM ZHEPITO ?OVGG?NS? IJ EB JGUUG
EEVU NBQ **WNPTYFDUOYY** VKLR
EEWE MXO LLSHSTN XVYF TYL FXG
WWEV EMBR FZ AVT MUZ AAV EH LIJ
EDWBM OTW YFEYPZ
FEEK ESL IJFLA
EDKEK BE TMZV NIYF KBEAYGH

Hints

The ciphertext corresponds with English words which means a space in the ciphertext is at the same position as a space in the plaintext.

The plaintext has been encrypted line by line.

All spaces have been removed prior to the encryption process and inserted in the ciphertext.

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