

Timed question:

EVEN IF I KNEW THAT TOMORROW THE WORLD WOULD GO TO PIECES, I WOULD STILL PLANT MY APPLE TREE.

1)

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

Here's how we get the answer. Since we are given that

K (10) → T (19)

N (13) → S (18)

From this we know:

$$(a \times 10 + b) \text{ mod } 26 = 19$$

$$(a \times 13 + b) \text{ mod } 26 = 18$$

Looking at the formulas we see that it is easiest to subtract the first from the last.

$$(a \times 13 + b) \text{ mod } 26 = 18$$

$$-(a \times 10 + b) \text{ mod } 26 = 19$$

$$a \times 3 \text{ mod } 26 = -1$$

$$a \times 3 \text{ mod } 26 = 25$$

Since $25 \div 3 = 8.\bar{3}$ we have to look for another value. $25 + 26 = 51$. $51 \div 3 = 17$ Now that we know that $a = 17$

Popping that back into any of the formulas (we pick the first one because it is the lowest multiplier)

$$(17 \times 10 + b) \text{ mod } 26 = 19$$

$$(170 + b) \text{ mod } 26 = 19$$

We can then subtract 170 from both sides

$$(170 + b) \text{ mod } 26 - 170 = (19 - 170) \text{ mod } 26$$

$$b \text{ mod } 26 = -157 \text{ mod } 26$$

$$b \text{ mod } 26 = 5 \text{ mod } 26$$

And we see that $b = 5$. However, we only know a few of the letters in the cipher:

T	S	J	P	K	V	E	D	V	L	Z	Q	U	V	Q	I	V	F	Z	H	I	V	J	M	F	P	L	Z	V	B	F	S	
K	N																															N

Our first step is to encode the common letters **ETAOIN** to see what they would map to. Note that we already know the mapping for E so we don't have to do that one.

E

$$E(4) \rightarrow 4 \times 17 + 5 \quad 73 \rightarrow V(21)$$

$$T(19) \rightarrow 19 \times 17 + 5 \quad 328 \rightarrow Q(16)$$

$$A(0) \rightarrow 0 \times 17 + 5 \quad 5 \rightarrow F(5)$$

$$O(14) \rightarrow 14 \times 17 + 5 \quad 243 \rightarrow J(9)$$

$$I(8) \rightarrow 8 \times 17 + 5 \quad 141 \rightarrow L(11)$$

$$N(13) \rightarrow 13 \times 17 + 5 \quad 226 \rightarrow S(18)$$

Filling in the letters we found (VQFJLS) we get a bit more of the answer

T	S	J	P	K	V	E	D	V	L	Z	Q	U	V	Q	I	V	F	Z	H	I	V	J	M	F	P	L	Z	V	B	F	S
K	N	O		E		E	I		T		E	T		E	A				E	O		A		I		E		A	N		

This doesn't give us enough to solve it quickly do we just take the next 5 letters **SRHLD**.

- S (18) → 18 × 17 + 5 = 311 → Z (25)
- R (17) → 17 × 17 + 5 = 294 → I (8)
- H (7) → 7 × 17 + 5 = 124 → U (20)
- L (11) → 11 × 17 + 5 = 192 → K (10)
- D (3) → 3 × 17 + 5 = 56 → E (4)

We know the reverse mapping of 5 more letters (ZIUKE) which we can fill in

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

While we could take some guesses (THE clearly shows up in the text and we are sure that H maps to a U) we can attack 5 more letters **CUMFP** from the frequency table that we were given with the test.

- C (2) → 2 × 17 + 5 = 39 → N (13)
- U (20) → 20 × 17 + 5 = 345 → H (7)
- M (12) → 12 × 17 + 5 = 209 → B (1)
- F (5) → 5 × 17 + 5 = 90 → M (12)
- P (15) → 15 × 17 + 5 = 260 → A (0)

This gives us the reverse mapping of 5 more letters (NHBMA) which we can fill in.

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

This leaves us with two letters that we don't know the mapping for, but a quick read tells us the two **P**s correspond to a **W** and the **D** must be the letter **G**. Doing the quick math confirms it

- W (22) → 2 × 17 + 5 = 379 → P (15)
- G (6) → 6 × 17 + 5 = 107 → D (3)

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

2)

RY RM JGY YGF YK LGGW DKZF UKZYQ NTKMGI HVI TGY

IT IS BETTER TO KEEP YOUR MOUTH CLOSED AND LET

WGKWTG YQ RVL DKZ HFG H OKKT YQHV YK KWGV RY HVI

PEOPLE THINK YOU ARE A FOOL THAN TO OPEN IT AND

FGUKAG HTT IKZJY.

REMOVE ALL DOUBT.

K1

	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
Frequency	1			2		4	12	6	4	2	12	2	2	1	1		3	4		6	2	5	4		11	4

K1	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
Replacement	V	W	X	Y	Z	R	E	A	D	B	O	K	S	C	F	G	H	I	J	L	M	N	P	Q	T	U

3) Please don't read this. For simplicity, Δ represents A and Σ represents B. Then split into groups of 5 and decode.

ΔΣΣΣΔ ΔΣΔΣΔ ΔΔΣΔΔ ΔΔΔΔΔ ΣΔΔΔΣ ΔΔΣΔΔ
ABBBA ABABA AABAA AAAAA BAAAB AABAA
P L E A S E

ΔΔΔΣΣ ΔΣΣΔΣ ΔΣΣΔΔ ΣΔΔΣΔ ΣΔΔΔΔ ΔΔΣΔΔ
AAABB ABBAB ABBAA BAABA BAAAA AABAA
D O N T R E

ΔΔΔΔΔ ΔΔΔΣΣ ΣΔΔΣΔ ΔΔΣΣΣ ΔΣΔΔΔ ΣΔΔΔΣ
AAAAA AAABB BAABA AABBB ABAAA BAAAB
A D T H I S

W O R K	W O R	K W	O R K W O	R K W
W H A T	Y O U	D O	T O D A Y	C A N
S V R D	U C L	N K	H F N W M	T K J

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

4) Different doesn't mean wrong.

GIANT MODEL LIVES AFTER METAL TABLE CLOCK BROKE.
AAABB ABAAA AABAB AABAB AABAA BAAAA AABAA ABBA.
D I F F E R E N

WHITE CHEST COVER BASIC PLAIN APPLE.
BAABA AAABB ABBAB AABAA BAAAB ABBA.
T D O E S N

THIRD COAST CIVIL BEACH HOTEL WATCH SMALL FRUIT MOVIE ALONE.
BAABA ABABB AABAA AAAAA ABBAA BABAA BAAAA ABBAB ABBA AABBA.
T M E A N W R O N G

5)

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

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

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

It is important to remember to ignore spaces and punctuation on both the text to be encoded and the encoding key.

6) THE TRUE SIGN OF INTELLIGENCE IS NOT KNOWLEDGE BUT IMAGINATION.

KUNKB INOLT JYHLJ KNXXL TNJRN LOJYK WJYDX NSTNQ
 THETR UESIG NOFIN TELLI GENGE ISNOT KNOWL EDGEB
 IKLMP TLJPK LYJ.
 UTIMA GINAT ION.

K1	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
Frequency		1		1				1	2	7	6	7	1	7	2	2	1	1	1	4	1		1	3	4	
Replacement	Q	R	V	W	X	Y	Z	F	U	N	T	I	M	E	S	A	B	C	D	G	H	J	K	L	O	P