Scratch Encryption

- Can you decrypt?
  - XUFHJ YMJ KNSFQ KWTSYNJW. YMJXJ FWJ YMJ ATDFLJX TK YMJ XYFWXMNU JSYJWUWNXJ. NYX HTSYNSZNSL RNXXNTS YT JCUQTWJ XYWFSLJ SJB BTWQIX, YT XJJP TZY SJB QNKJ FSI SJB HNANQNEFYNTSX, YT GTQIQD LT BMJWJ ST TSJ MFX LTSJ GJKTWJ.

Scratch Encryption

- Step 1

- Is there any single letter words in the CipherText.
- In English the only single letters are "I" and "a".

- Unfortunately there is no single letter words in the CipherText.

Scratch Encryption

- Step 2
- Count how many times each letter appears in the CipherText

A	B	C	D	E	F	G	H	I	J	K	L	M
2	5	1	2	1		2	3	3		5	5	

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
	0	1		1			4	0				2

Scratch Encryption

- Step 2
- Count how many times each letter appears in the CipherText

A	B	C	D	E	F	G	H	I	J	K	L	M
2	5	1	2	1	9	2	3	3	27	5	5	7

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	0	1	7	1	16	18	4	0	11	14	15	2

- The top three letters in the CipherText are "J", "T" and "S".

Scratch Encryption

- Step 3
- The most popular letters in the English language are:
- E, T, A, O, I, N, S, H, R, D, L, C, U, M, W, F, G, Y, P, B, V, K, J, X, Q, Z

- Unfortunately this only works for a large piece of text like a book, however for this small piece of text we can use the popular letters in English as a good guide.

- "J", "T" and "S" in the CipherText may not necessarily map to "E", "T" and "A" in PlainText.

Scratch Encryption

- Step 4
- To find out what type of letter "J", "T" and "S" are we count how many times each letter appears before and after the letters below in the CipherText.

	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
J																										
T																										
S																										

Scratch Encryption

- Step 4
- Almost every English word contains at least one vowel. It is likely that vowels will be next to all the letters.
- Consonants are limited in the number of letters they appear next to.

	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
J	0	3	1	0	0	0	1	1	0	2	2	2	5	1	0	1	0	0	6	0	0	0	7	5	1	0
T	1	1	0	1	0	0	1	1	0	0	2	2	0	2	0	0	2	0	7	0	0	0	4	0	3	1
S	0	0	0	0	0	3	0	0	1	6	0	2	0	3	0	0	0	0	0	7	0	0	0	1	3	1

- "J" is a vowel. It appears next to 14 of the 26 letters
- "T" is a vowel. It appears next to 13 of the 26 letters
- "S" is a consonant. It appears next to 9 of the 26 letters

Scratch Encryption

- Step 5
- "J" in CipherText most likely maps to "e" in PlainText because its a vowel and appears most often in the CipherText.

- To prove "J" maps to "e" we use one of the most common three letter words in the English language the word "the".

- In English language the letter "H" is often found before "e" but rarelyafter.

Scratch Encryption

- Step 5
- This is a table of how many time each letter of the CipherText alphabet appears before and after the letter "J".

	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
After J	0	3	1	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	3	2	0	0
Before J	0	0	0	0	0	0	1	1	0	0	1	2	5	1	0	0	0	0	5	0	0	0	4	3	1	0

- In the CipherText the letter "M" appears five times before the letter "J". The letter "M" never appears after "J"

Scratch Encryption

- Step 6
- Lets start replacing the CipherText letters with the PlainText letters.
- Replace "J" with "e" and "M" with "h".

Scratch Encryption

X	U	F	H	e		Y	h	e		K	N	S	F	Q		K	W	T	S	Y	N	e	W	.				
Y	h	e	X	e		F	W	e		Y	h	e		A	T	D	F	L	e	X		T	K		Y	h	e	
X	Y	F	W	X	h	N	U		e	S	Y	e	W	U	W	N	X	e	.		N	Y	X					
H	T	S	Y	N	S	Z	N	S	L		R	N	X	X	N	T	S		Y	T		e	C	U	Q	T	W	e
X	Y	W	F	S	L	e		S	e	B		B	T	W	Q	I	X	,		Y	T		X	e	e	P		
T	Z	Y		S	e	B		Q	N	K	e		F	S	I		S	e	B									
H	N	A	N	Q	N	E	F	Y	N	T	S	X	,		Y	T		G	T	Q	I	Q	D		L	T		
B	h	e	W	e		S	T		T	S	e		h	F	X		L	T	S	e		G	e	K	T	W	e	