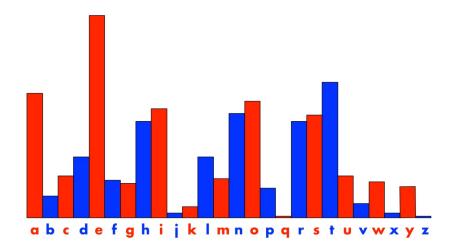# Cracking Ciphers With Frequency Analysis

One of the oldest ways to crack ciphers is called **frequency analysis**. It was invented over a thousand years ago by a Muslim scholar Al-Kindi.

First, take lots of normal writing and count how often each letter appears (the frequency of the letters) as shown in the histogram. For example, in English, E is the most common letter with T and A next (notice where the peaks in the histogram are).

To crack a secret message, count how often each letter appears in that message. Then compare the results with the histogram.

Can you decrypt this computing joke?

> TXHVWLRQ ZKDW GLG WKH FRPSXWHU ZRUUB PRVW
> PLJKW KDSSHQ DW KDOORZHHQ DQVZHU D EBWH
> IURP D YDPSLUH

First make a tally chart counting the letters in the joke. As E is the most common letter in English, one of the most common letters in the message is probably E. A and T are also likely to be frequent. Then start to guess words.

HINT SHEET

1. E, T and A are the most common letters so the peaks in your tally chart are likely to be them. Try the most common as E, but if that doesn't work (having tried some of the hints below) then try E as the second most common letter.

2. As this is a short message the least common letters are less likely to match their frequency so make guesses.

3. For example, how many 1 letter words do you know? A and I Could they be any of the words. A is very common, I is less so, so your frequency tally could help.

4. THE and AND are common three letter words to look for.

5. If you know what the message is about look for words about that topic. If the message is about the weather then look for weather words like RAIN.

6. Look for double letters. They are likely to be SS, TT, EE, FF, LL, MM or OO.

7. Q is always followed by U

8. S often ends words

9. Look for common digraphs like: TH, CH and SH

BIG HINT

If you know something about different kinds of ciphers, having used frequency analysis to get started you can look for the patterns of a particular cipher. For example, in a Caesar Cipher the letters of the alphabet are just shifted. Once you know E, the next letters could stand for F, G, H and so on. A give away is if there is another peak 4 letters back (for A). Fill in the letters and see if a message emerges!