

# How to Solve A Substitution Cipher

## UW-Stout Junior STEAM Experience

### Single-Letter Words

If the encrypted message shows spaces, you should easily be able to identify lone letters. The only two commonly used single letters are **I** and **a**.

### Frequently Used Letters

Remember **ETAOIN**. These are the six most frequently used letters in English writing. Chances are the most frequent letters in the encrypted message should be mapped to one of these letters.

### Apostrophes

If the text includes apostrophes, you can narrow down the letters after to the apostrophe to only a handful of possibilities. These include **'T** (like *can't, won't, didn't*), **'s** (like *she's, he's, it's*), **'d** (like *I'd, she'd, they'd*), **'m** in *I'm*, **'re** (like *they're, you're*), **'ve** (like *I've, they've you've*), and **'ll** (like *I'll, she'll, they'll*).

### Two-Letter Words

The most common two letter words include the following: **of, to, in, it, is, be, as, at, so, we, he, by, or, on, do, if, me, my, up, an, go, no, us, am**

### Three-Letter Words

There are a lot more three-letter words, but there are some that are more common. The two most common three-letter words are **the** and **and**. Some others include **for, are, but, not, you, all, any, can, had, her, was, one, our, out, day, get, has, him, how, man...**

### Common Two-Letter Combos

The term “digraph” means two-letter combinations that frequently are paired together. For example, if you have the letter *H* at the end of a word, the most likely combinations are **-ch, -ph, -gh, -sh, -th**. Here are some other common digraphs: **wh, ck, sk, lk, ke, qu, ex**

### Common Prefixes and Suffixes

Words that are longer than five letters sometimes include common beginnings of words (prefixes) or common endings (suffixes).

Some common word beginnings include **de-, dis-, en-, in-, im-, mis-, over-, pre-, re-, un-**

Common word endings include **-able, -al, -ed, -en, -er, -est, -ful, -ible, -ic, -ing, -ion, -ive, -less, -ly, -ment, -ness, -ous**

### Use a Website

There are a number of websites that will count the frequency letters in the encrypted message and allow you to fill in letters easily. The American Cryptogram Association has a free site here: <https://www.cryptogram.org/resource-area/solve-a-cipher/>

## Cheat

There are many websites where you can type in the encrypted text and it will attempt to solve it for you. Of course this takes the fun out of it, but sometimes you are stumped and need the help. A good one I've found is Boxentriq, created by a puzzle enthusiast to solve all sorts of different ciphers. You can solve simple substitution ciphers here: <https://www.boxentriq.com/code-breaking/cryptogram>. The Cipher Identifier Tool on this website can be used to identify what type of cipher is used