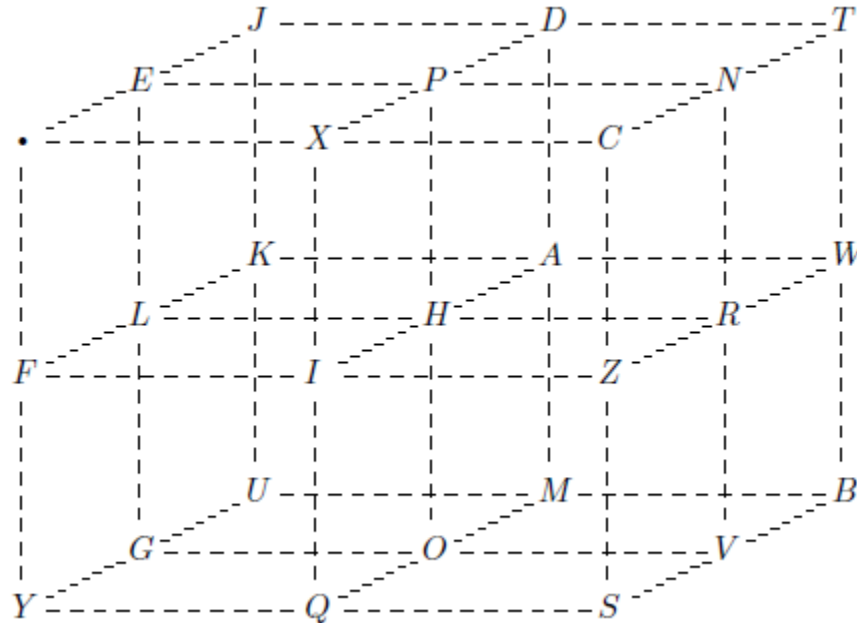# Trifid Cipher

The Trifid Cipher was created in 1902 by Félix Delastelle. It is simple and complex with how it encodes and decodes a message. The letters of the alphabet are placed in a 3x3x3 randomly along with a "." for the final spot. An example is below:

Suppose we want to encrypt the message "MESA Rocks" using a trifid cipher with encryption key consisting of period 3 and the above array.

1. Imagine a coordinate axes so that the lower left corner has a value of (1,1,1). The positive x-axis is to the right, the positive y-axis is the diagonal away from the reader, and the positive z-axis is vertical. We can represent the letters in our message with their coordinates in the encryption array

   231 123 311 232 322 221 313 132 311

2. Now arrange these in columns

   2 1 3   2 3 2   3 1 3

   3 2 1   3 2 2   1 3 1

   1 3 1   2 2 1   3 2 1

   and separate the columns into groups of 3 (the period is 3).

3. Concatenate (link numbers together in a chain) as we normally read:
   213323313321332131131221321

4. Finally, taking the digits in the string from Step 3 in groups of 3, use the key array to replace each group with its corresponding character to obtain the ciphertext:
   XNCVWUUOV

To Decrpyt the message, the process is very similar. Suppose we have the same array with the encrypted message: WW.PEWAEZRWN in period 4.

1. Determine the 3 digit code for each letter

> 332 332 113 223 123 332 232 123 312 322 332 323

2. Create the columns and separate them into groups of 4.

> 3 3 2 3   1 2 3 3   3 1 2 3
>
> 3 2 1 1   3 2 2 3   2 2 3 3
>
> 3 2 2 3   2 1 2 3   2 3 2 3

> Notice how the values are placed in order moving left to right. After the fourth digit is placed, the row wraps to the next line to create the columns. Because the period is 4, we only want 4 columns per grouping.

3. The 3 digits in each column are the locations of the letters. Our concatenated numbers are:

> 333322212313132221322333322123232333

4. Finally, take the digits from Step 3 and decipher the text to get "Trick or treat."