GraFX Cipher: A Cipher Based on Transformations in the Cartesian Plane

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GraFX Cipher is a cipher in which text can be encrypted. We use the basic idea that all transformations made to a point on the Cartesian plane can be reversed in order to revert back to the original point. For our cipher to function we have a public table of 16 transformations (0-F), these can be translations, rotations, reflections, or others that can be applied to any point each of which can have 16 different magnitudes. We take some arbitrary length hexadecimal key and we split it into parts of 2 characters each of which represents one transformation to be applied. We can take our text that is to be encrypted and by using the Unicode dataset we can place every single character onto the plane in a different place. We can then apply the 1st part of the key to the 1st character, the 2nd part of the key to the 2nd character and so on. If the key is longer than the text this is beneficial as it will add more layers of security. Our cipher is secure as every character receives a different set of transformations applied to it and a total of 256 transformations make it very difficult to determine which transformations have been applied. It is also difficult to determine the order of transformations as a rotation followed by a shift will produce a different result to a shift followed by a rotation. To decrypt our cipher we utilize the same key but in reverse and every transformation, we do the opposite of. Our cipher runs relatively quickly but remains quite inefficient.

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