Steganography: Steganography is a type of secret communication where the existence of a message is concealed. You can remember this by looking at the two parts of the word "stegano-graphy." Both parts are of Greek origin. The Greek word "steganos" means "covered," and the Greek word "graphein" means "to write." Thus, a literal translation of steganography could be "covered writing." The most simple form of steganography exploits the properties of digital images to hide messages. If you zoom in close enough on a digital image, you will notice that the image is really composed of thousands of different-colored dots. If possible, it is possible to change up to half of the dots and hide the human eye. You will also notice that the image is really composed of thousands of different-colored dots. If possible, it is possible to change up to half of the dots and hide the human eye. Therefore, you can also see the hidden picture.

There are several different forms of steganography:

**Invisible Ink:** Even in ancient times, metal ink was used to hide messages. One example is using lemon juice on off-white parchment. Only by holding the parchment up to a light will you be able to see the secret message:

```
Greetings attention NY. June 1.

Taking the second letter in each word the following message emerges:

Apparently neutral's protest is thoroughly discounted and ignored. I mean that hard. Blackened tissue affects
```

**Music Cipher:** In this method, notes on a scale correspond with letters in the alphabet. The message can be communicated through sheet music or actual sound:

```
Pershing sails from NY June 1.
```

**Null Cipher:** A null cipher is a type of hidden message where the real message is "camouflaged" in an innocent sounding message. A famous example of a null cipher is one sent by a German Spy in WWII:

```
If Hitler is one sent by a German Spy in WII:
```

```
A null cipher is a type of hidden message where the real message is "camouflaged" in an innocent sounding message. A famous example of a null cipher is one sent by a German Spy in WWII:
```

**Digital Images:** This fairly new method of steganography exploits the properties of digital images to hide messages. If you zoom in close enough on a digital image, you will notice that the image is really composed of thousands of different-colored dots. If possible, it is possible to change up to half of the dots and hide the human eye. Therefore, you can also see the hidden picture.

Thus, during the cold war, this satellite image of a Soviet airfield…
In this example, only a sophisticated computer would be able to discover the hidden satellite image.

**Watermarking** is a technique that embeds an image inside another image. For instance, many pieces of fine stationery have watermarks. US paper currency also uses watermarks; hold a new ten or twenty-dollar bill up to a light source to reveal the image hidden within the paper. 

Cryptography is a type of secret communication that uses encryption, which is a way to scramble the real message, also known as the plain text message, into a meaningless cipher text, something that looks like a jumble of letters or numbers. The only way to decrypt, or figure out, the real message is to use a “key”.

<table>
<thead>
<tr>
<th>Plaintext</th>
<th>Encryption</th>
<th>Ciphertext</th>
<th>Decryption</th>
<th>Original</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You can remember what cryptography means by looking at the two parts of the word: the Greek word _kryptos_, which means „secret“ (κρυπτός), is combined with the Greek word _logos_, which means „word“ (λόγος). You can remember what steganography means by looking at the two parts of the word: the Greek word _ الكريم_ (κριμα) is combined with the Greek word _γραφω_, which means „write“ (γράφω).
So how can you "break" a Caesar cipher? First, look for breaks between words. If you see one letter standing alone, there is a good chance that it is "I" or "A." Also, look for repeated letters and double letters. (HINT: Did you know that there are no words in English that have a double "Q" in them?)

Keyword Substitution: A keyword substitution uses a key word, such as "count," instead of a number for the key. To write a keyword cipher, first write out the alphabet, then write the key word directly below the first few letters of the alphabet. Complete the second row by writing in order the unused letters. Thus, if we use "count" as our key word, our keypad becomes this:

```
    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
    c o u n t a b d e f g h i j k l m p q r s v w x y z
```

The Pigpen Cipher: This ancient cipher is the combination of a tic-tac-toe board and the alphabet. Each part of the alphabet is represented by the part of the pen:

```
    I    I    I    I    I    I
    I    I    I    I    I    I
    I    I    I    I    I    I
    I    I    I    I    I    I
    I    I    I    I    I    I
    I    I    I    I    I    I
```

Breaking pigpen ciphers is not very difficult. However, you can use the same methods that are suggested for breaking Caesar ciphers.