**Level 1: Simple substitution Cypher**

Use this resource to answer the following questions.

<http://practicalcryptography.com/ciphers/simple-substitution-cipher/>

1. Summarize and explain the concept of a substitution cypher
   1. What does it do? It substitutes every plaintext character for a different cipher text character
   2. How does it work? A simple sentence which is in plain text would become and be seen just as jumbled letters.
   3. What is a “key”?  A table that maps every possible character in the plaintext message to a different value
2. Provide an example of encoding a message using a substitution cypher key.

Plain text: Hello my name is Muktika

Cipher text: tcxxs vr juvc fp voazfau

Key: uwmecqytfiaxvjsgnkpzobhdrl

1. Provide an example of decoding a message using a substitution cypher key.

Cipher text: qmovq od se nqayvogu luxvu

Plain Text : abira is my favorite genre

Key: qmctunlworzhsxybpvdgkaifej

1. Summarize and explain the concepts related how “cryptanalysis” can be used to “break” a code.
   1. How does the “frequency analysis of letters” work? The frequency distribution of the letters in the cipher text is calculated to
   2. How does the “frequency analysis of words” work?

**Level 2: Morse Code**

Use this resource to answer the following questions.

<http://www.newworldencyclopedia.org/entry/Morse_Code>

1. Summarize and explain the concept of Morse code
   1. What does it do? transmitting telegraphic information, using standardized sequences of short and long elements to represent the letters, numerals, punctuation and special characters of a message
   2. How does it work?
   3. What does it use instead of a “key”?

Standardized sequences of short and long elements are used. They consist of sounds, marks, or pulses, in on off keying and are commonly known as "dots" and "dashes" or "dits" and "dahs."

1. Compare the Morse code table to the “frequency of letters” analysis in Level 1 above.
   1. What is the shortest code and how does it correspond to the frequency of letters?
   2. What is the longest code and how does it correspond to the frequency of letters?
   3. What is the benefit of having a variable length code for letters?
2. Provide an example of encoding a message using Morse code.
3. Provide an example of decoding a message using Morse code.

**Level 3: Encryption**

Use this resource to answer the following questions.

<https://computer.howstuffworks.com/encryption.htm>

1. Summarize and explain the concept of Symmetric-key Encryption. (See Slide 3)
   1. How is it similar to a “substitution cypher”?
   2. How is it different from a “substitution cypher”?
2. Encryption key strength is related to the number of bits and combinations. (See Slide 3)
   1. What is DES and how strong is it?
   2. What is AES and how strong is it?
3. Summarize and explain the concept of Public-key Encryption. (See Slide 4)
   1. How is it different from Symmetric-key Encryption
   2. What is an Asymmetric-Key?
4. Prime Numbers and Hashing Algorithms are used to encrypt messages. (See Slide 6)
   1. What is a Hash Value?
   2. How is a Hash Value used to encrypt a message?
   3. How is a Hash Value used to decrypt a message?
   4. How strong are current Public Keys (Hash Values) in terms of bits and combinations?
5. We use encryption every day when we use the internet and the following services. (See Slides 4 & 5)
   1. What is PGP?
   2. What is SSL / HTTPS?
   3. What is a Digital Certificate?
   4. What is a Certificate Authority?