**CODING - ENCRYPTION**

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| **Grade/ Grade Band**: 6-12 | **Topic Data Transfer:** Coding - encryption | **Lesson #** \_\_\_\_\_ **in a series of** \_\_\_\_\_ **lessons** |
| **Brief Lesson Description**: This is a scaffolded lesson as how data is transferred on the wireless internet. It is designed with multiparts where teacher has options to do all or part of the activities. First activity is demonstrating transferring ASCII values. Second activity is ASCII values plus hash values. Third activity is encrypting and decrypting data.  |
| **Specific Learning Outcomes:** Wireless transfer of data |
| **Narrative / Background Information**  |
| **Prior Student Knowledge Required:** dividing Integers and find remainders, evaluating functions |
| **Problem Solving Practices (Ex: Standards for Mathematical Practice):** [CCSS.Math.Content.HSF.IF.C.9](http://www.corestandards.org/Math/Content/HSF/IF/C/9/)Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [CCSS.ELA-Literacy.WHST.6-8.2](http://www.corestandards.org/ELA-Literacy/WHST/6-8/2/)Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. | **Main Content Ideas:** * How data is transferred through wireless connection.
* What are some methods used to encrypt data
 | **Possible Multidisciplinary Concepts:** Math and Computer Science |
| **Possible Preconceptions/Misconceptions:**  |
| **LESSON PLAN – 5-E Model**  |
| [**ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:**](http://www.youtube.com/watch?v=PUB1GU_tvpI&safe=active) * Describe what is happening in this picture.
* When Alice is typing words in her laptop to send a message to Bob. The computer converts the letters into codes. What type of codes are they and what do they look?
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| **EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions:** In this lesson, students will be introduced how data is converted and transferred on between two computers. The activities demonstrates the difference between coding data vs. encrypted data which includes hash values. The connected topic to the COSMOS concept is network security. |
| **EXPLAIN: Concepts Explained and Vocabulary Defined:** This lesson introduces simple concept of data transfer and demonstrate the between coding vs. encryption.**Key Vocabulary:** Coding, decoding, hash value, ---%5 (mod function), encryption, decryption,functions,one to one functions, algorithms, ASCII. |
| **ELABORATE: Applications and Extensions:** This is a scaffolded lesson as how data is transferred on the wireless internet. It is designed with multiparts where teacher has options to do all or part of the activities. First activity is demonstrating transferring ASCII values. Second activity is ASCII values plus hash values. Third activity is encrypting and decrypting data.  |
| **EVALUATE:** **Summative Assessment (Quiz / Project / Report):** What is the difference between sending encoded vs. encrypted messages?Explain how math is applied to encrypt messages: |
| **Elaborate Further / Reflect: Enrichment:** This activity can be enriched by having students explore other ASCII characters that would share the same hash values.For example, all following mod function will evaluate the same remainder.* 12%5 = 2
* 17%5 = 2
* 22%5 = 2

What other numbers can give you the same value of 2?Questions: 1. Original message: XYZ2. What would be the encrypted message if the key is f(x) = x$2$ - x + 4 using #%3 as mod function?3. Can there be other encrypted messages that might have the same hash value? Justify and give examples.4. What are some problems you can foresee ????? |