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| **Lesson Title :** Vulnerabilities in Cyberspace | **Unit #:**  **1** | **Lesson #:**  **1** | **Activity #:**  **2** |
| **Activity Title:** Failures in a Client Messaging Program |

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| **Estimated Lesson Duration:** | 5 days |
| **Estimated Activity Duration:** | 3 days |

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| **Setting:** | Classroom |

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| **Activity Objectives:** |

1. Create list of vulnerabilities used in cyberspace attacks
   1. Single Handshake
   2. Reflection
   3. Diffie-Hellman
   4. Timestamp
2. Identify examples of how critical thinking is used in cyberspace security

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| **Activity Guiding Questions:** |

1. Why would it be important to encrypt messages?
2. What are ways to hack messages?
3. What current events are related to cybersecurity?Explain?

| **Next Generation Science Standards (NGSS)** | |
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| **Science and Engineering Practices (Check all that apply)** | **Crosscutting Concepts (Check all that apply)** |
| ☐ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☐ Developing and using models | ☐ Cause and effect |
| ☐ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☐ Analyzing and interpreting data | ☐ Systems and system models |
| ☐ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function. |
| ☐ Engaging in argument from evidence | ☐ Stability and change. |
| ☐ Obtaining, evaluating, and communicating information |  |

| **Ohio’s Learning Standards for Science (OLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☐ Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Ohio’s Learning Standards for Math (OLS) and/or**  **Common Core State Standards -- Mathematics (CCSS)** | |
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| **Standards for Mathematical Practice (Check all that apply)** | |
| ☒ Make sense of problems and persevere in solving them | ☒ Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☒ Attendto precision |
| ☒ Construct viable arguments and critique the reasoning of others | ☒ Look for and make use of structure |
| ☒ Model with mathematics | ☒ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, OLS and/or CCSS):** |

* Foster increases in the number of Ohio citizens studying and working in STEM fields
* Foster increases in all students developing stronger skills in problem solving, innovation, and teamwork

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

* Internet
* Guided Notes

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| **Teacher Advance Preparation:** |

* Set desks up in group format

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| **Activity Procedures:** |

* Day 1
  + Internet
    - Students will have a lot of freedom during this activity to search the internet for vulnerabilities
* Day 2
  + Introduce Single Handshake
  + Introduce Reflection attack
    - Have students practice with partners
* Day 3
  + Introduce Diffie-Hellman
  + Introduce Timestamp
    - Have students practice with partners

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

* Research Format Worksheet

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

* None

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.  Refer to Activity Template for details. |

* None

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson. |

The three days that I had outlined for this activity could be adjusted to account for only two days. The independent research proved very difficult for students because they did not have enough prior knowledge of the subject of cybersecurity to even know where to start. Next year, I will either cut out the first day of this activity or give students a lot more guidance. The last two days went very well and students were definitely challenged to understand the critical thinking behind solving cybersecurity vulnerabilities. These two days set up a foundation that students could use in the next two activities.