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| **Lesson Title** : Attack & Defense | **Unit #:**1 | **Lesson #:**2 | **Activity #:**3 |
| **Activity Title:** Developing a Client Messaging Program |

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| **Estimated Lesson Duration:** | 7 days |
| **Estimated Activity Duration:** | 2 days |

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| **Setting:** | Classroom |

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| **Activity Objectives:** |

1. Use interactive partner groups to embed security protocols and encrypt messages to prevent others from decoding it.

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| **Activity Guiding Questions:** |

1. How are messages sent in cyberspace?
2. What protocols would be used to secure secret messages?

| **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) |

* Partners
* Notes from Security Protocol Research done in Activity 2

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| **Teacher Advance Preparation:** |

* List of teams

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| **Activity Procedures:** |

* Day 1
	+ Get into assigned teams of four and designate two people as “Clients” and two people as “Attackers”.
	+ Clients must send an encoded message to each other by setting up security protocols based on research from previous day.
* Day 2
	+ Teams switch roles so Clients become Attackers and Attackers become Clients
	+ Repeat same steps as Day 1 with reversed Roles

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

* Exit Slip
	+ Students will write up a reflection on how their group performed at intercepting the secret message and how their group performed in sending secret message.
	+ Teacher will assess student understanding using a rubric.

**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. |

 This activity was changed significantly from what I originally planned. The ability level was not appropriate for these intro to computer science students to adapt and change a complex coding game. For this reason I took the same principles of basic security protocols and had students send a secret message to a partner without it being intercepted from the other team. This worked out much better and students showed a significantly higher understanding of these protocols compared to their pre-test. Next year I will consider doing this activity before students research security protocols to see if they can come up with some of the protocols on their own.