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| **Lesson Title : Applying Statistics to Secure a Network** | **Unit #:**  **1** | **Lesson #:**  **3** | **Activity #:**  **4** |
| **Activity Title: Preventing Password Cracking** |

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| **Estimated Lesson Duration:** | **10min** |
| **Estimated Activity Duration:** | **40min** |

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| **Setting:** | **Classroom** |

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| **Activity Objectives:**   * **Students will be able to identify the components of a strong password, and understand the vulnerabilities associated with weak passwords.** * **Students will understand an application significance testing in a real world context.** * **Students will create an interpret a confidence interval in the context of a real world problem.** |

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| **Activity Guiding Questions:**   * **What are the consequences of just one member of an organization’s account being compromised.** * **What if the person who was compromised was a manager…. Secretary to the president of a company….. the head of IT?** * **How do organizations know if they are at risk (before an attack occurs)?** * **Can organizations do anything to prevent user accounts from being compromised?** |

| **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):** |

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| **Materials**:   * Activity 4 Worksheet * Activity 4 Data * Calculators |

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| **Teacher Advance Preparation:**   * Teachers should review the concept of strong and weak passwords (<https://www.youtube.com/watch?time_continue=1&v=trr4B5qOu84>) * Teachers should prepare groups ahead of time, and have copies of the activity worksheet and data ready. |

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| **Activity Procedures:**   * The teacher should start by reviewing information about strong and weak passwords. * After the necessary background information is reviewed, split students up into groups of 4. * When students are split into their groups, pass out the worksheet and data, * Inform students that they will have 30 minutes to complete the questions and presentation. * The teacher should circulate during the activity, making sure all students are participating in the activity. * At the end of the 30 minutes, randomly select one group to present their analysis and suggestions for the organization going forward. |

**Formative Assessments:** None

**Summative Assessments:** Final Presentation of Results

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| **Differentiation:** Grouping – Students will be grouped homogeneously so when circulating, I will be able to focus my attention on the groups that are struggling. |

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| **Reflection:** This activity was a great review for the AP Exam. It forced students to go through the entire process of reading and understanding the context of the question, choosing the correct statistical method to perform the analysis and then using the results to make decisions based on quantitative evidence. This activity also contrasts proportions and means for students who are still struggling to understand the concept. |