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| **Name:James Prugh** | **Contact Info:** | **Date:7/15/16** |

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| **Lesson Title : Algorithms** | **Unit #:** | **Lesson #:1** | **Activity #:****2** |
| **Activity Title: Algorithms** |

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| **Estimated Lesson Duration:** | **1 day** |
| **Estimated Activity Duration:** | **1 day** |

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| **Setting:** | **High school classroom** |

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| **Activity Objectives:**  |

1. **Use simple algorithms to solve math problems.**

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| **Activity Guiding Questions:**  |

1. **What is an algorithm?**
2. **How does the long division algorithm work?**
3. **How are algorithms used in internet security?**

| **Next Generation Science Standards (NGSS)**  |
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| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| [x]  Asking questions (for science) and defining problems (for engineering) | [x]  Patterns |
| [ ]  Developing and using models | [ ]  Cause and effect |
| [x]  Planning and carrying out investigations | [ ]  Scale, proportion, and quantity |
| [ ]  Analyzing and interpreting data | [ ]  Systems and system models |
| [x]  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)** |
| [x]  Make sense of problems and persevere in solving them | [x]  Useappropriate tools strategically |
| [x]  Reason abstractly and quantitatively | [x]  Attendto precision |
| [x]  Construct viable arguments and critique the reasoning of others | [x]  Look for and make use of structure |
| [x]  Model with mathematics | [x]  Look for and express regularity in repeated reasoning |

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

[CCSS.MATH.CONTENT.HSF.IF.A.1](http://www.corestandards.org/Math/Content/HSF/IF/A/1/)

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

<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxqYW1lc3BydWdoMjAxNnxneDo2ZjEzZDQ2MDRkNjY3Yzgz>

<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxqYW1lc3BydWdoMjAxNnxneDo2Y2I0NTgwODQyNmRjY2E1>

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| **Teacher Advance Preparation:** |

Worksheet assigned the previous day:

<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxqYW1lc3BydWdoMjAxNnxneDoxMjI2NWU4NjEzZWQwNzQ2>

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| **Activity Procedures:** |

1. Students are placed in groups of 4 and asked to work on questions provided.
2. Groups share solutions and methods
3. Students are given a different set of questions and asked to share out results.
4. Teacher provides a summary discussion of findings

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

The teacher will monitor the group work.

**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.

The class will be given a problem involving finding a square root by hand.

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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. |

Heterogeneous grouping will be used and roles will be defined: leader, recorder, time-keeper, presenter

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

Students found the algorithms interesting, and I was especially pleased with their interest in the historical context of the work. Prior to this lesson, most students thought that finding a square root was a calculator exercise with no mathematical basis. The algorithm for greatest common divisor helped reinforce long division skills that are needed when dividing polynomials.

I hope to introduce several other algorithms throughout the year.