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| **Lesson Title : Sorting Trash** | **Unit #:****1** | **Lesson #:****2** | **Activity #:****4** |
| **Activity Title: The Challenge** |

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| **Estimated Lesson Duration:** | **4 days- 45 minutes** |
| **Estimated Activity Duration:** | **120 minutes** |

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

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| **Activity Objectives:****Students will:****Create a process to sort trash by research and collaboration****Compare their process with others and modify** **Present the process to the class and judge others processes** |

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| **Activity Guiding Questions:****What are the chemical and physical properties of different materials?****How can I use the physical properties to sort trash without human interaction?****What materials at my house and in my classroom could be used to sort materials?** |

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

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

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| **Common Core State Standards -- Mathematics (CCSS)** |
| **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, ONLS and/or CCSS):*** 1.A.2 - Distinguish between chemical and physical properties and between chemical and physical changes.
* 1.A.3 - Classify specific examples as either chemical or physical properties. Classify specific examples as either chemical or physical changes.
* 1.A.6 - Classify selected elements as metals, nonmetals, or metalloids based on observations of chemical and physical properties.

Next Generation Science Standards* When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-PS2-c),(HS-PS3-b),(HS-LS2-j),(HS-ESS2-b),(HS-ESS3-f),(HS-ESS3-h)
* Testing should lead to improvements in the design through an iterative procedure. (HS-PS2-c),(HS-PS3-b),(HS-PS4-d) (HS-ESS3-f)
* The aim of engineering design is not simply to find a solution to a problem but to design the best solution under the given constraints and criteria. (HS-PS2-a),(HS-PS3-b),(HS-LS2-l),(HS-ESS2-c),(HS-ESS3-b),(HS-ESS3-f)
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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

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| **Teacher Advance Preparation:****Teacher should have the Engineering Process sheet printed for groups. They should have the materials being tested available. They should have the groups of 3 chosen beforehand.**  |

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| **Activity Procedures:** **-The teacher will introduce the activity by saying that they thought about all of the possible questions that the students came up with and decided to do this one.** **-They will go through the powerpoint with the students explaining the challenge, the time allotted, the constraints, the roles, the EDP process, and answer any questions.****- They will then break up the class into the groups and have them assign their roles.** **-The students will then work on the project for the next 3 days.****-On the fourth day the students will present their process to the class as well as rating each others effectiveness.**  |

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

1.2.4.e and 1.2.4.f are both formative assessments

**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.

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| **Differentiation:** Although I did not know my students very well at the time of this implementation, I tried to group them based off of whom could fulfill the various roles. Someone who had good handwriting but didn’t want to take a central role was the recorder. The leader was someone I knew could make sure that all of the task were complete. The researcher was a person I knew could use their computer to look up good ideas and quality research. I did not allow students to pick their own roles which I think was a good decision.  |

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| **Reflection:** Overall the lesson went very well. The students struggled at first but eventually learned how to work together to make a successful design. Many were shocked that there was no right answer and that there were multiple ways to solve the problem. If I could change anything about this lesson, It would be that the students could have seen an actual recycling sorting facility. I think that would have made the activity much more real world for the students.  |