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| **Lesson Title : Devising an Optimized Business Plan** | **Unit #:1** | **Lesson #:2** | **Activity #:4** |
| **Activity Title: Building the best t-shirt design and business plan.** |

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| **Estimated Lesson Duration:** | **5 days** |
| **Estimated Activity Duration:** | **5 days (Challenge parts are worked on throughout the Unit.)** |

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| **Setting:** | **Middle school classroom, 8th grade students in an urban setting.** |

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| **Activity Objectives:**  **The students will design a data collection process that will assist them in communicating a business plan for an 8th grade t-shirt.** |

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| **Activity Guiding Questions:**  **What factors play into purchasing a t-shirt?**  **At what price point do students loose interest in buying a shirt?**  **What logos are the most popular and generate the most interest?**  **What would be the best material to use for the shirt? Traditional v/s dry fit?**  **What are necessary characteristic to make the shirt dress code acceptable?**  **How would you generate interest in buying your t-shirt?** |

| **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 New Learning Standards for Science (ONLS)** |
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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)** |

| **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, ONLS and/or CCSS):** |

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies)  Business plan template  Scoring rubric |

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| **Teacher Advance Preparation:** |

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| **Activity Procedures:**   1. **Present the challenge** 2. **Finish presenting the challenge. Outline all of the goals, tasks, and constraints of developing a t-shirt. Inform them that the design of evaluating student likes or interest with regards to the t-shirt is key in winning the right to send their t-shirt to production. The evaluators will be assessing them on their ability to support the interest of their design mathematically.** 3. **Clearly lay out the procedures for assigning a survey to be completed by their peers in an effort to make educated decisions based on student interest.** 4. **Refer back to the various examples of data that we have worked with this unit. Students should have several previous examples to draw upon for data collection ideas.** 5. **Work time for working on business plan** 6. **The teacher is working the room encouraging, helping students work through issues, and fixing tech problems that arise.** 7. **Students will need the guidance of the teacher to maintain focus and feel the sense of urgency toward completing the task. Students are on a pretty strict timeline as far as presenting their business plans in three class days.** 8. **DAY 2- Students will need a brief introduction and review to bring the given task back into focus for the day. Remind them of the task, its purpose, and the timeline that they are on.** 9. **At this point all groups should have a survey instrument developed and a plan to administer it. They will need to have all of their data collected prior to the halfway point in class.** 10. **The second half of the class, students will need to think about business plan presentations that they will make. Each group will be constructing data displays that highlight why they feel their design is the best. Students will need to complete the business plan template and turn it in. They should be rehearsing their pitch.** 11. **Presentation of business plan.** 12. **An extra day can be inserted here in the event that students are not ready to present their plans. (Extra day might be built in just in case.)** 13. **The teacher will assemble a panel of judges. There are several possibilities for this; principals, teachers, central office personal, or UC faculty/staff. The judges will be predetermined so that it will be important to schedule this day meticulously.** 14. **Students will present their business plans under a time constraint. This will help the teacher honor the time of the judges. We will use the elevator pitch format to give each group a five minute window. One minute of travel time on the front and back ends, with approximately 3 minutes to pitch their plan. At the conclusion of the five minute window time is up. They will be asked to take a seat.** 15. **Judges are to be completing a simple rubric scoring guide for each design which will determine a winner of the project.** 16. **At the completion of the presentations the teacher will collect all scoring rubrics and tally the results for a winner.** 17. **The winning design will be sent to the high school printing press for production.** |

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

Teacher will formatively assess work throughout the class periods. Provide as much feedback to as many groups as possible.

**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.

Unit assessment

Challenge rubric

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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.  Grouping are based on student ability. The business plan grade is part production and part cooperation. Students will need to working cooperatively in a professional manner. This should help all students find success with the task.  Posttest will be modified for students with accommodations. |

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson.  In general I was pleased with the lesson. The student groups worked hard to create t-shirts that accomplished the challenge and could potentially be put into production. Several of the students were extremely passionate about their designs and really wanted to win the competition. And like any lesson, there were a few students that put forth the minimum effort to task completion. Overall the lesson was highly successful at engaging kids in learning. I will be using the unit again this year with a different group of students.  A modification I will make for future instruction is timeline adjustments. Students didn’t need 5 consecutive full class periods to complete the task, actually they needed a longer window of class periods with less time in class to construct data items. Most of the student’s data collection happened in the common areas of the school, so they needed more time to develop survey instruments and then collect data. Aside from minor timing issues the challenge functioned much like I had hoped it would. |