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| **Text Set Title: Scientific Method & Engineering Design with *The Martian*** | |
| **Text Set Grade Placement: 9-12** | |
| **Enduring Understandings** | |
| The scientific method can be applied to real-world inquiries in order to re-evaluate current understandings, gain new knowledge, and develop new theories.  The engineering design process can be applied to real-world problems faced by humanity to develop solutions and new technologies to improve overall quality of life for people around the world. | |
| **Text and Resources**  (Indicate in what order the supporting works are to be introduced and taught.) | |
| **Anchor Text** | **Title:** *The Martian*  **Author:** Andy Weir |
| **Supporting Works** | **Book(s)**  1. *Food Engineering: From Concept to Consumer* by Michael Burgan  2. *Lives of the Scientists: Experiments, Explosions (And What the Neighbors Thought)* by Kathleen Krull  **Article(s)**  3. “Estimating Costs for Ship Building and Repairs” - http://www.brighthubengineering.com/naval-architecture/123374-estimating-costs-for-ship-building-and-repairs/  4. “The Human Body in Space” - https://www.nasa.gov/hrp/bodyinspace  **Poem(s)**  1. “Scientific Inquiry” by Susan Blackaby https://www.sciencefriday.com/educational-resources/poetry-and-science-experimental-design/  **Infographic(s)**  3. The Engineering Design Cycle https://www.advancementcourses.com/blog/the-engineering-design-process-the-4-key-steps-to-stem-teaching-and-learning/  4.  https://s3.amazonaws.com/user-content.enotes.com/081c0f0c5c3d7a647020b957b26d09eecd9c7fc2.pnghttps://www.enotes.com/jax/index.php/images?eventHandler=Answer&uploadID=8764&answerID=725064  **Other Media**  5. *The Martian* (film)  **Supporting Works will be introduced/taught in the following order:**  “Scientific Inquiry”  *Lives of the Scientists*  Scientific method infographic  Engineering Design infographic  *Food Engineering*  “The Human Body in Space”  “Estimating Costs for Shipbuilding…”  *The Martian* (film) |
| **Standards** | **CLE 3210.Inq.3** Use appropriate tools and technology to collect precise and accurate data.  **CLE 3210.Inq.4** Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.  **SPI 3210 Inq.2** Analyze the components of a properly designed scientific investigation.  **SPI 3210 Inq.4** Evaluate the accuracy and precision of data.  **SPI 3210 Inq.6** Determine why a conclusion is free of bias.  **CLE 3210.T/E.2** Differentiate among elements  of the engineering design cycle: design constraints, model building, testing, evaluating, modifying, and retesting.  **CLE 3210.T/E.4** Describe the dynamic interplay among science, technology, and engineering within living, earth-space, and physical systems.  **SPI 3210.T/E.2** Evaluate a protocol to determine the degree to which an engineering design process was successfully applied.  **SPI 3210.T/E.4** Use design principles to determine how a new technology will improve the quality of life for an intended audience.  􀀹**3210.Math.3** Make decisions about units, scales, and measurement tools that are appropriate for investigations involving measurement.  􀀹**3210.Math.4** Select and apply an appropriate method to evaluate the reasonableness of results. |
| **Rich, Authentic Task** | |
| **Carrying Cargo Challenge**  Students will be engaged in a hands-on activity to test the efficiency of various cargo boat designs. In testing, students will collect data using 3D-printed boat models and determine which design is superior in terms of total cargo mass. Students will explore scientific approaches, engineering design, and mathematical applications, namely developing a procedure to select a boat while meeting several constraints. In part 2 of the activity, students will have the opportunity to design their own boat prototype. This will allow students to apply both the scientific method and the engineering design process.  Source: http://www.cpalms.org/Public/PreviewResourceUpload/Preview/150966 | |