**STEM 2023**

**Water Bottle Rockets – Reflection Assignment**

**Task:** Design, Build, and Test Water Bottle Rockets to Achieve Maximum distance

**Reflection:** Prepare a comprehensive presentation showcasing your design thinking process. Include:

* A summary of the challenge and your goals.
* Diagrams of your initial prototype, highlighting its key features.
* Pictures of each iteration of your rocket, clearly showing the modifications you made.
* Test results, including altitudes reached and any observations during testing.
* An explanation of how you applied the design thinking process to improve your rocket's performance.
* Lessons learned, challenges faced, and insights gained throughout the project.

**Design Thinking Process:**

**1. Empathize:** Understand the challenge and the needs of your rocket. Consider the forces at play, such as thrust, drag, gravity, and lift. Research the basics of rocket design and aerodynamics.

**2. Define:** Clearly define the goals and constraints of your rocket. What materials will you use? What size and shape will your rocket be? How will you ensure stability during flight?

**3. Ideate:** Generate multiple ideas for your rocket's design. Sketch out different configurations, propulsion systems, and recovery mechanisms. Think outside the box and encourage innovative concepts.

**4. Prototype:** Choose the most promising design from your ideation phase. Create a physical prototype of your rocket using materials like plastic bottles, cardboard, tape, and foam. Include diagrams of your initial prototype, showing its key features and components.

**5. Test:** Launch your rocket multiple times and record the results. Measure the altitude reached, flight stability, and any issues encountered during testing. Use these results to iterate on your design, making necessary adjustments to improve performance.

**6. Iterate:** Based on the test results, refine your rocket's design. Make changes to the shape, weight distribution, or propulsion system as needed. Create diagrams of each iteration, noting the modifications you've made.

**7. Feedback:** Discuss your results and iterations with your peers. What did you learn from each iteration? How did your changes impact the rocket's performance? Use this feedback to further refine your design.

**8. Final Prototype:** Create a polished final prototype of your water bottle rocket. Include detailed diagrams showcasing all components, such as the nose cone, fins, pressure chamber, and nozzle.

**9. Test and Evaluate:** Launch your final prototype and measure its maximum altitude. Compare this with your initial launches and assess how well your design achieved the goals you defined.