Project Based Learning at FTSD

Montana has adopted the Next Generation Science Standards (NGSS), and the water wheel activity aligns particularly well with the Engineering Design and Physical Science strands.

At the end of October, all eighth-grade students participated in an interdisciplinary learning experience focused on water power. Students explored the history of watermills in the United States, how hydropower is used in Montana today, and how off-grid users harness energy from small streams. They also learned how water wheels function and viewed examples of different water wheel designs.

Working in pairs, students brainstormed, designed, and built their own water wheels using everyday materials—such as paper plates, spoons, index cards, plastic cups, straws, popsicle sticks, paper clips, and tape—while staying within a set budget. Each design was tested using rice to simulate flowing water. The most efficient water wheel generated a total of 22,000 joules using four liters of rice.

Throughout the project, students followed the Engineering Design Process, conducting research, brainstorming ideas, planning and designing their models, building and testing prototypes, and evaluating results to improve or modify their designs.

Engineering Design:

- Define a design problem with criteria and constraints.
- Develop and test models.
- Analyze data from tests to determine how well a solution performs.
- Iterate and improve designs.

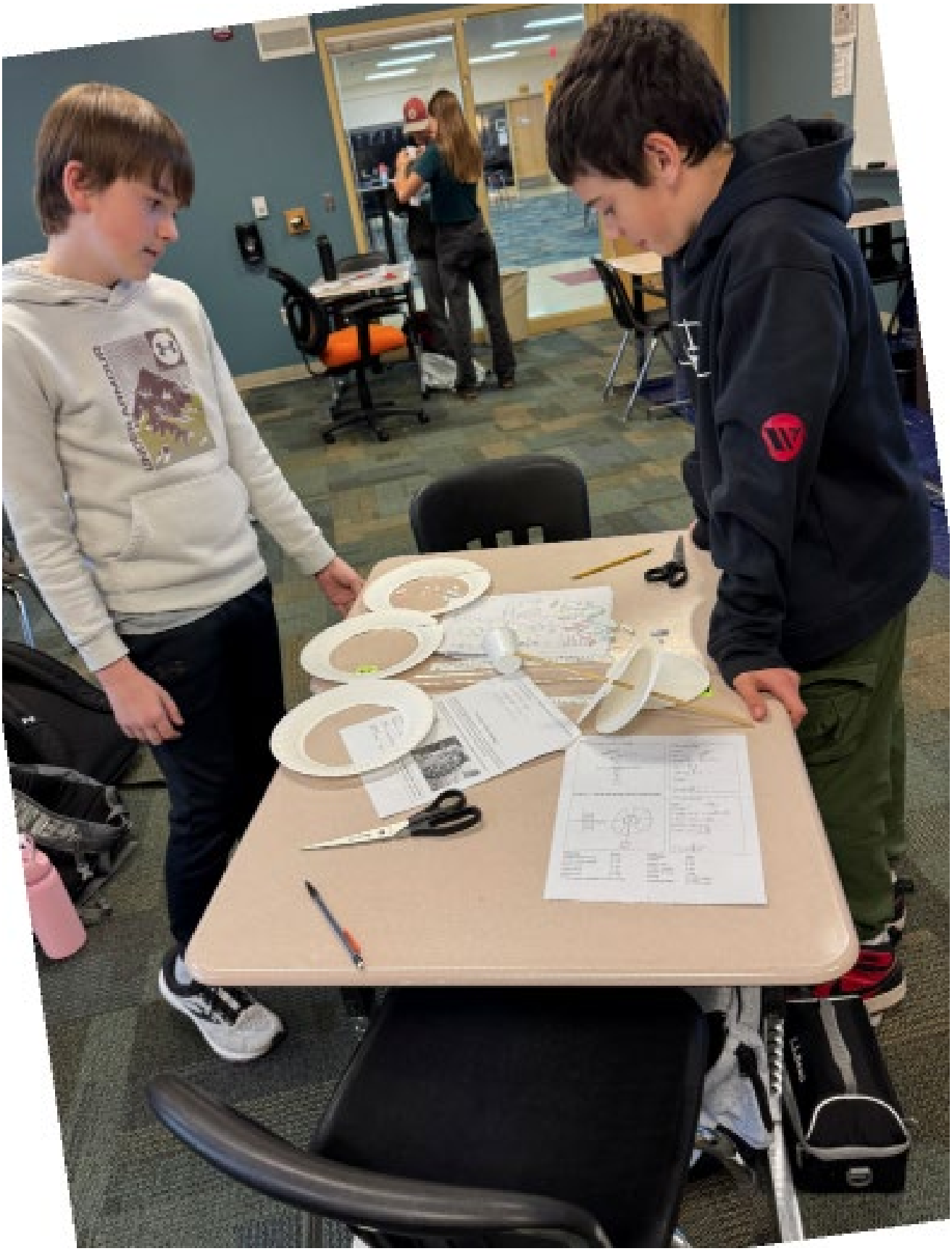
Career & Workforce Connection

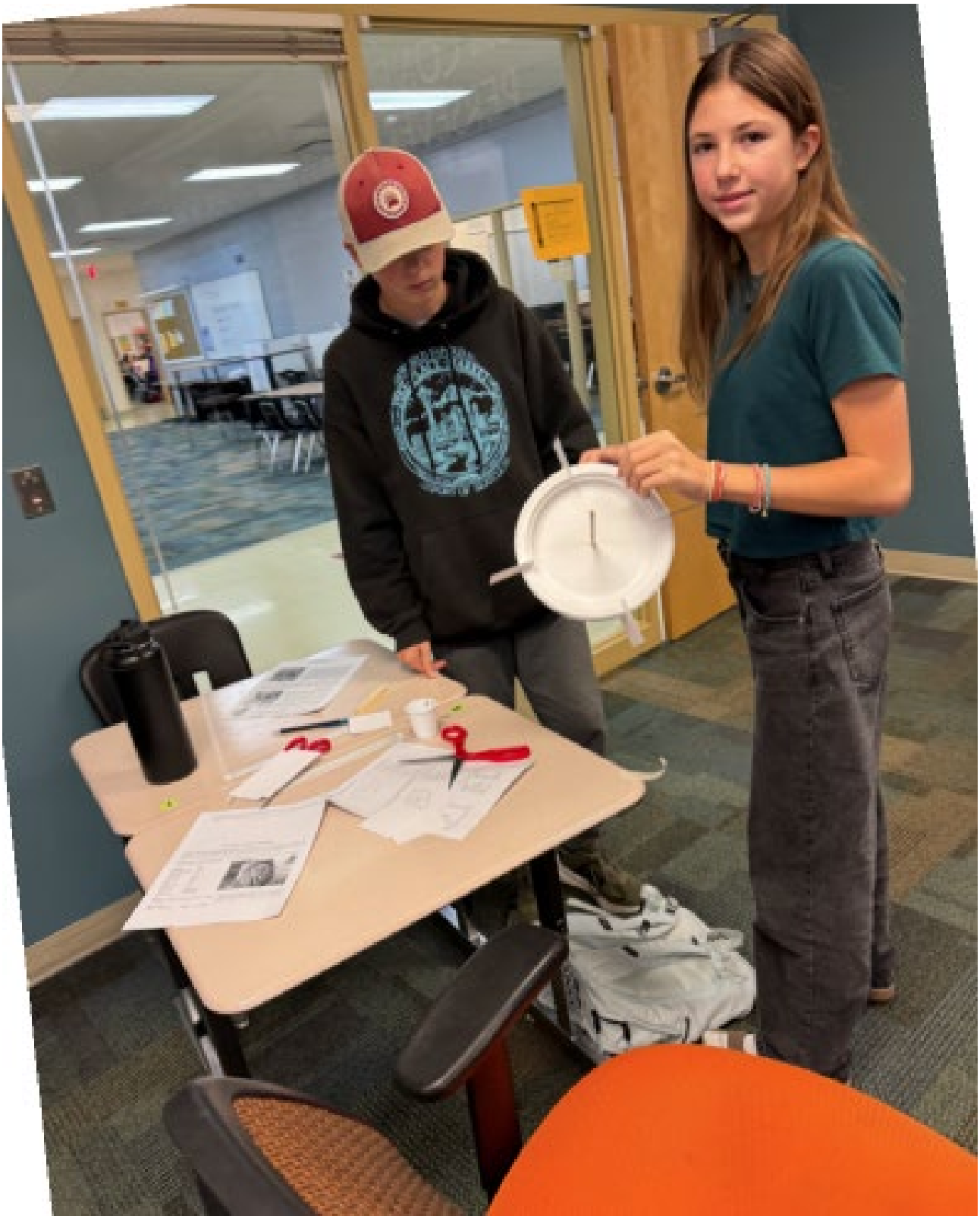
- Projects like this allow students to learn science by doing science; mirroring how engineers and technicians solve real problems in Montana's energy, infrastructure, and natural resource industries.

Career Pathways

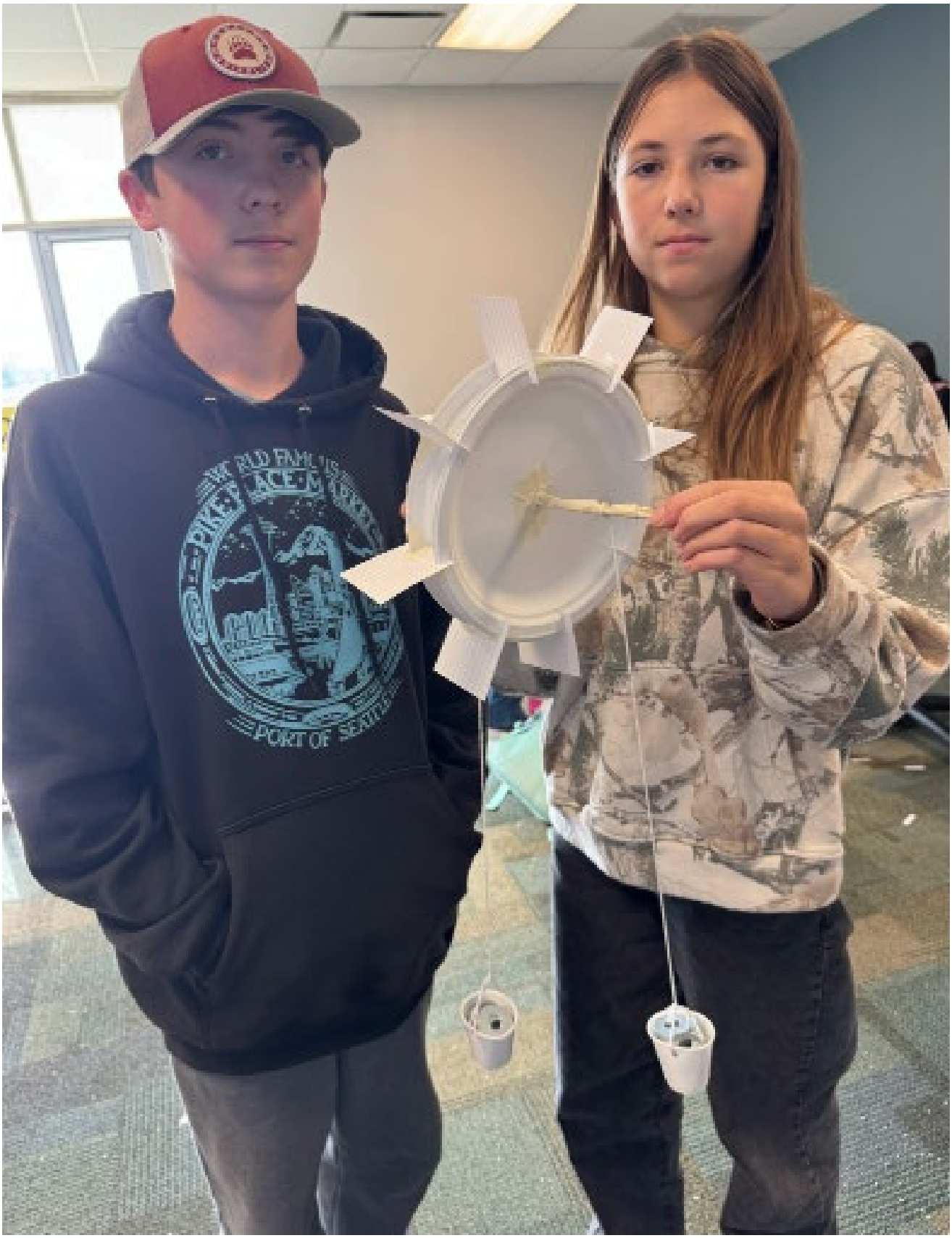
- **Energy & Infrastructure**
  - Hydropower & Renewable Energy
  - Utilities & Energy Systems
  - Water Resource Management

- **Skilled Trades & Technical Careers**
  - Construction & Fabrication
  - Industrial Maintenance
  - Systems Technicians



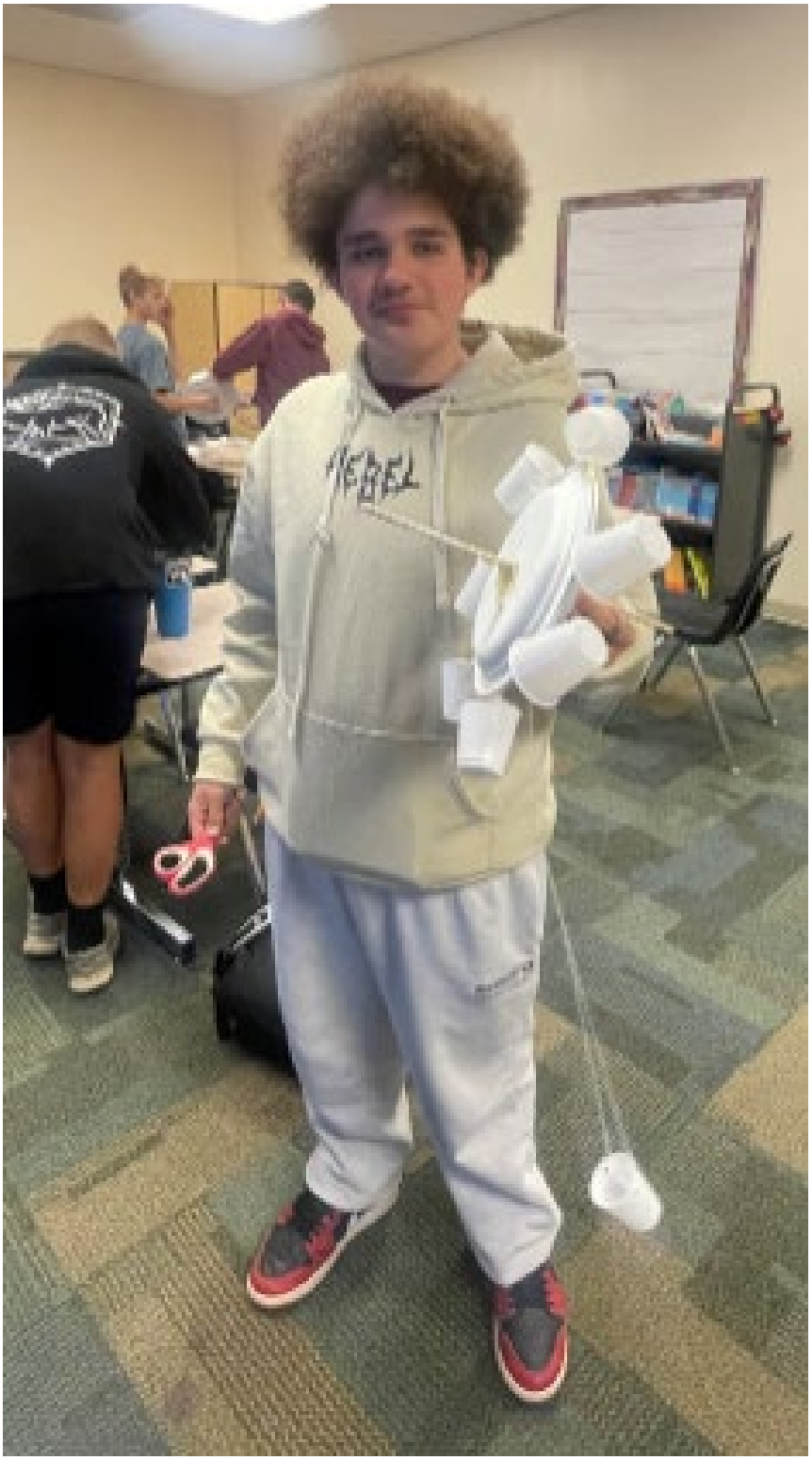



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