

## Core Skills Analysis

### Science (Physics and Engineering)

- The child learned how pulleys work as simple machines to make lifting easier by changing the direction and amount of force needed.
- They experienced firsthand the concepts of force, gravity, and mechanical advantage by physically using the rope and pulley system to lift themselves.
- The activity demonstrated energy transfer and the role of friction in real-world mechanical devices, given the setup's visible pulleys and moving parts.
- They observed the engineering design of a pulley system—how components such as wheels and ropes are combined to solve practical problems like lifting heavy loads.

### Physical Education and Motor Skills

- The student practiced coordination and strength by using their arms to pull the rope and support their body weight while seated on the pulley seat.
- The activity encouraged problem-solving and spatial awareness as the child learned to control their movements while using the equipment safely.
- It fostered confidence and joy in physical activity, shown by the child's happy expression while engaging with the interactive installation.
- The hands-on approach helps develop fine motor skills through grasping and pulling the rope while maintaining balance on the seat.

### Social and Emotional Learning

- The child demonstrated patience and turn-taking skills while waiting for their turn among other participants.
- Positive social interaction is implied as the child engages in public, possibly sharing the experience with family or peers.
- They built self-confidence and independence by physically managing the pulley system on their own.
- The fun, interactive nature of the exhibit likely encouraged curiosity and a positive attitude toward learning through play.

### Tips

To deepen the scientific understanding and engagement with pulley systems, extend learning by building a simple pulley setup at home using common materials like strings and spools. Encourage the child to experiment with different pulley configurations to see how they change the effort needed to lift a weight. Connect these experiences with exploring other simple machines such as levers and inclined planes by creating hands-on challenges. Additionally, incorporate storytelling or role-play where the child imagines being an engineer designing machines to solve real-life problems, nurturing creativity and critical thinking. For physical skills enhancement, set up safe obstacle courses that require climbing, pulling, and balance activities, reinforcing motor coordination and strength.

### Book Recommendations

- [Simple Machines and How They Work](#) by David Glover: A clear, illustrated introduction to simple machines including pulleys, perfect for young readers to understand basic physics concepts.
- [Motion: Push and Pull, Fast and Slow](#) by Diana Noonan: This book explains the ideas of force and motion with relatable examples and lively illustrations to enrich a child's grasp of physical science.
- [Rosie Revere, Engineer](#) by Andrea Beaty: A story about a young girl who loves inventing and

engineering, inspiring children to embrace problem solving and creativity.

### **Learning Standards**

- CCSS.ELA-LITERACY.RI.4.3 - Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text.
- NGSS 3-5-ETS1-1 - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- NGSS 4-PS3-4 - Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- PE Standards 1.MC.1 - Demonstrate competencies in motor skills and movement patterns needed to perform a variety of physical activities.

### **Try This Next**

- Create a worksheet with diagrams of different pulley setups for the child to label parts and predict which setup requires the least effort.
- Design a quiz or discussion prompts about the physics of pulleys and their everyday applications to reinforce understanding.
- Have the child draw their own pulley machine and write a short explanation of how it works and what problem it solves.