



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Using Mechanical Advantage to Lift

Finalist's Name: Pake VanderLinden

School and City: West Grand Middle School, Kremmling

Sponsor's Name: Katie DeBell

Category: Physics & Astronomy (PHYS)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

Abstract

Using Mechanical Advantage to Lift

Pake VanderLinden

The purpose of my project is to find out which mechanical advantage works the best to lift 37 lbs. I hypothesized that the 5-1 would work best.

The experiment involved using 1-1, 2-1, 3-1, 4-1, and 5-1 mechanical advantages to lift 37 lbs 36in into the air. I used mechanical advantage to determine the amount of force required to lift the load and hold the load. Then, I determined the length of pull required to lift the load to a designated height.

The data collected did support the hypothesis. I found that the 5:1 was the best at lifting 37lbs a few inches into the air, however the 5:1 took a lot of rope and the load moved slow. If I want the load to move faster it might take effort, but I would use a lower mechanical advantage.

These findings led me to believe that in the end the 5:1 requires the least amount of force for lifting the load. A 3:1 requires more force but less length of pull and the load moves faster. Selecting the appropriate mechanical advantage is dependent on the task you are trying to accomplish.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Pake VanderLinden

Date:

2/26/24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.