



## Colorado Science and Engineering Fair

## 2025 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: Thermal Effects on Human Hair Elasticity

Finalist's Name: Maya J Lewis

School and City: Summit Middle Charter Boulder

Sponsor's Name: Peter Teasdale

Category: Physics & Astronomy

Division: Junior (grades 6 - 8)

Abstract (250 words or less):

Many people curl and straighten their hair every day without knowing the full damage that straightening can do. When excessive heat is applied to hair, the keratin chains in the medulla begin to degrade and break, causing the hair to break easier because it can withstand less force. Therefore, an increase in heat applied to hair increases susceptibility to breakage. Samples of human hair from people of the ages of 8-12 were tested at different heats and stretched with forces to determine the elasticity changes before and after heat is applied. With the exception of the control experiment, the required force to break the human hair decreased as heat increased at increments of 50°F starting at 250°F and ending at 450°F. The force needed to break the hair with no applied heat is consistently nearly triple that of the hair with 450°F of applied heat. The t-tests that showed the largest difference were the extreme difference, which was 75-450°F and 400-450°F. 75-450°F had a t-test result of 0.00000000000019158946111386 and 400-450°F which had a t-test result of 0.00001327098531628860000000. The similarities of the data decreased as the heat increased (with the exception of the control experiment vs 250°F). This means that the change in hair elasticity increased. Control-250°F and 250°F-300°F had values over 0.5% so it could be said that they are the same. These results support the hypothesis which stated that an increase in heat will make the hair more susceptible to damage.

*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:

Date:

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.**