



# 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: How the temperature affect the distance a soccer ball travel?

Finalist's Name: Mario Jacobo

School and City: Wiggins Middle School

Sponsor's Name: Adriana Carrazco

Category: Physics & Astronomy (PHYS)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

The purpose of this project was to see how temperature affects the distance a soccer ball travels. My hypothesis was that if I put a soccer ball in the freezer for 24 hours it would get smaller and had less distance than one that is exposed to high temperature.

The experiment involved having the materials on hand. Place each ball in its place. One was in the freezer at a temperature of 5 degrees Fahrenheit. The other was under a heat lamp at a temperature of 95 degrees Fahrenheit. These two balls were in this process for 24 hours. After they had completed their time on display, I took them to the gym where they were thrown through the basketball machine and that way I was able to measure the distance they traveled. The measurement point was where they made the first rebound.

The data collected when doing this experiment was able to verify that the distance a soccer ball travels was affected by temperature. The ball that was exposed to high temperatures traveled further and had a stronger bounce compared to the ball that was exposed to low temperatures. Another observation was that the ball exposed to the low temperature lost density compared to the other. This happened because when the atoms are at low temperatures they join together and if they are at high or ambient temperatures they expand. My hypothesis was correct since the ball in the freezer lost size and density.

In one of the first experiments, the ball exposed to cold traveled 255 inches and the other ball exposed to heat traveled 262 inches.

These findings lead me to believe that whenever an object is exposed to cold its atoms will join together. A situation that I can compare in everyday life is that we as humans when we are cold tend to close our arms more and perhaps curl up in a ball. But when we are hot we obviously tend to raise our arms or wear less clothing.

*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: *Mario Jacobo*

Date: *2/29/24*

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.