# CALIFORNIA STATE SCIENCE FAIR
## 2010 PROJECT SUMMARY

**Name(s)**
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**Project Number**
**J0213**

**Project Title**
## Does Temperature Affect a Tennis Ball's Bounce?

**Abstract**

**Objectives/Goals**
My question is if I place tennis balls in different temperature environments, will the temperature of the surrounding air affect how high the ball will bounce?

**Methods/Materials**
Methods: 1) I divided 100 new tennis balls into five groups of 20 balls. Each group was placed in one of five temperature environments (cold, cool, room temperature, warm and hot); 2) I wrapped two groups of 20 balls individually in foil and placed one group in an oven set at 100 degrees Celsius and the other group in an oven set at 120 degrees Celsius. I placed the third group of balls in a refrigerator at 6 degrees Celsius, the fourth group in a freezer at -15 degrees Celsius, and the final group was left at room temperature, or 46 degrees Celsius; 3) Each group was removed from its environment after 30 minutes and was taken immediately to the test area. Each ball from each group was dropped from the same height and with same amount of force by use of a ball dropper I made; 4) For each group of balls, I measured each ball's bounce using a) a poster that I marked with a ruler, b) a videotape, and c) photographs; 5) I calculated the average height of each test group to determine whether temperature affected the ball's bounce.

Materials: 100 brand new tennis balls; "L" bracket; door; boards; butcher paper; ruler; black marker; red masking tape; metric measuring chart; tin foil; plastic baggies; thermometer; ladder; oven; refrigerator; freezer; saw; screwdriver; and video camera.

**Results**
The average height of the ball's bounce for the five temperature groups ranged significantly from lowest to highest. The Cold Group (-15C) averaged 53.5 cm; the Cool Group (6C) averaged 98.5 cm; the Room Temperature Group (46C) averaged 114.5 cm; the Warm Group (100C) averaged 136.5 cm; and the Hot Group (120C) averaged 142.5 cm.

**Conclusions/Discussion**
My hypothesis was correct. The hot balls bounced the highest and the cold balls bounced the lowest. The change in temperature affected the height of the ball's bounce by altering the temperature of the air in the ball and also the elasticity of the rubber.

**Summary Statement**
I exposed new tennis balls to five different environments (cold, cool, room temperature, warm and hot) to learn whether temperature affects a tennis ball's bounce.

**Help Received**
My father help me by building the wooden supports to hold the door upright, fastening the L bracket to the door, and sawing the tennis balls in half.