



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Margaret Yu	Project Number J1527
-------------------------------	---------------------------------------

Project Title
Elasticity Madness: If and How Temperature Will Affect the Elasticity of Nylon Stockings

Abstract

Objectives/Goals
The purpose of this project is to determine if and how temperature will affect the elasticity of nylon stockings. Research on thermoplastics, elasticity, entropy, and temperature suggests that temperature will affect the elasticity of nylon stockings. At lower temperatures, nylon stockings will be more elastic than at higher temperatures.

Methods/Materials
The hypothesis was tested using 15 nylon stockings (Fashion Knee-Hi Sandalfoot 96% nylon 4% spandex), a tough board 40 cm x 50 cm, a thermostat, 10 clips, and a metric ruler. The 5 Control stockings were stretched at 25°C, the 5 Experimental 1 stockings at 15°C, and the 5 Experimental 2 stockings at 35°C. The original length of each nylon stocking was measured first. Then the thermostat was set to the corresponding temperature. Each group was stretched with the clips over the board length for 4 hours. Afterward, the final length of each stretched stocking was measured. Then, the initial difference (50 cm - the original length), the stretched difference (50 cm - the final length), and the elasticity (stretched difference/the initial difference) was computed. These steps were repeated until all 15 nylon stockings were tested.

Results
The hypothesis was supported by the experiment. The average elasticity of the Experimental 1 stockings was 0.594 while the Experimental 2 stockings only had an average elasticity of 0.160. The Control stockings had an average elasticity very close to the Experimental 1 stockings: 0.581. The Experimental 1 stockings were about 73.1% more elastic than the Experimental 2 stockings.

Conclusions/Discussion
The hypothesis that the nylon stockings at lower temperatures would be more elastic was strongly supported. A relevant elasticity was measured by dividing the stretched difference by the initial difference.
This project explains why nylon stockings shouldn't be exposed to hot temperatures. The elasticity of thermoplastics can also be better preserved from this project.
If this experiment could be done again, the three groups would be arranged so that their average initial difference would be about the same to produce a more relevant elasticity. Also, the stretched length would be made longer to obtain more extreme results. Lastly, I would test to see if larger temperature intervals will give a more significant result and if there is a limit to how low the temperature can be in order for the elasticity to remain high.

Summary Statement
This project examines if and how temperature will affect the elasticity of nylon stockings.

Help Received
Parents helped buy materials.