

**Julianna Manfredo**

Junior Division Physics

*How Well "Suited" Are You For Space?: A Comparison Of Materials For Insulation*

The purpose of this project is to test what combination of fabrics would provide the best insulation for a spacesuit. The following procedure will be followed: Select nine different fabrics that the researcher believes will provide warmth and/or insulation. Cut fabrics into 24" x 6" rectangles. Make three different combinations of fabrics. Glue the fabrics for each combination together. Sew Velcro at the tops and sew edges of prototypes together except for the top. Fill three plastic bottles with water as close to 98.6°F. Slide one bottle into each spacesuit prototype. Close each spacesuit. Place heater around prototypes to test a warm environment. Wait one hour and record temperature of water. Repeat placing prototypes in the freezer to test a cold environment. Repeat placing prototypes in dry ice to test extreme cold environment. The "spacesuits" definitely did insulate against the change in temperature in the heated, cold, and extreme cold environments. Overall, the Control had an average temperature change of 33.2°F while Prototype #1 had an average temperature change of 13.3°F. Prototype #2 had an average change of 18.9°F and Prototype #3 a change of 21.9°F. Looking at these results as a whole, Prototype #1 definitely insulated the best. It insulated the best due to the types of fabric chosen. My project could be used in a real life situation such as if NASA was trying to design a more reliable, weather/environment proof spacesuit. My advice to them would be to design it to insulate well but to make it lightweight enough that the astronauts would not get too warm. If it did not insulate well enough then the astronaut would get hypothermia and probably die.