



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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Project Title Hiding In "Plane" Sight: Minimizing Radar Reflection	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The Radar Cross Section (RCS) of a plane can be lowered by the design of the shape of the aircraft. Also, some stealth aircraft have skin that is radar transparent, behind which are structures termed reentrant triangles. Radar waves penetrating the skin get trapped in these structures, reflecting off internal faces. My project is to use light to simulate radar waves and investigate different types of reentrant triangles to minimize light reflection back to the source. Although visible light is at a different wavelength than radio waves, the scattering and reflection of the waves is similar.</p> <p>Methods/Materials A light and a light meter were attached to the top of a stand inside a black shoebox. The test objects were placed directly under the light meter. The light meter measured the reflected light from the test objects. Different three-dimensional shapes were tested to examine the reflectivity of light/radar.</p> <p>Results Thirteen shapes and surfaces that were identical in size and color were examined for their light reflectivity. Six measurements were made for each shape, and standard deviations were determined. Large differences in light reflectivity were observed for the test objects. My experiments showed that a simple up-down-up-down (zig zag) shape was the best to reduce the reflection of the light, and instead, scatter the waves.</p> <p>Conclusions/Discussion Stealth aircraft are designed to avoid large flat surfaces. Sharp edges on the body of the plane and a thin profile reduce the RCS. In addition, some aircraft use small shapes beneath a radar-transparent skin to maximize the scattering of the radar signal. In this experiment, I was interested in looking at different triangular and pyramid shapes to see which ones were the best at minimizing reflection. My experiments demonstrated that beneath the large flat surfaces of a stealth aircraft, a zig zag pattern could be used to increase radar scattering. This would reduce the RCS of the aircraft, and make the plane much more stealthy to avoid detection.</p>	
Summary Statement I examined the scattering and reflection of light off various shapes to model the properties of radar waves in order to improve stealth-aircraft technology.	
Help Received Father helped paint test objects.	