



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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Project Title The Weird World of Planets in Binary Star Systems	
Abstract Objectives/Goals For centuries, scientists have been exploring the wonders of binary star systems. We have come a long way since the studies of Ptolemy who acknowledged the first binary star, Eta Sagittarii. But until recent discoveries, planets were thought to be absent in binary systems whose stars were relatively close. Now, new research has begun into the weird world of planets in binary star systems. Using a custom written gravity simulation software program, observations can be made of the affects of a binary system on a planet orbiting one of the stars in the system. Methods/Materials By varying the separation (in Astronomical Units), mass (in Jups), and velocity of the planet, one can observe a planet's orbit in a binary system. Planets were placed into ten real binary systems using the software. The hypothesis stated that the affect on the orbit of the planet will depend on the relative mass of each star, separation between the stars and the orbit and mass of the planet. Results When the separation between the two stars was greater, the two stars in the binary system had a small effect on the orbit of the planet. But when the velocity or separation of the planet was increased, the two stars had a greater effect on the planet. The changes in the mass of the planet had little effect on the orbit. During the orbit of the planet orbiting the star HD 185507, the planet switched orbits to the other star. Conclusions/Discussion Through observation of planetary motion in binary star systems, it has been acknowledged that planets will be unable to survive for long periods of time. The effect of the binary star system varies depending on the distance between the two stars and the mass, velocity, and separation of the planet. One objective was to see if a planet could switch orbits between stars. This happened with the star system HD 185507 but the orbit was not sustained for long. What a weird world it would be to be living on a planet with two suns rising and setting at different times.	
Summary Statement The observation of the effects a binary star system would have on a planet orbiting one of the stars.	
Help Received Father helped edit; Science teacher helped edit and provide advice; Cousin helped with custom software	