



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Caleb J. Brown	Project Number J1902
Project Title Where in the World? Finding Your Location Using Gravity, the Earth's Magnetic Field, and a Sundial	
Abstract Objectives/Goals Determine if one can find his/her location on the earth using a Foucault's pendulum, a compass and a sundial to triangulate their position. Methods/Materials I used the shortest shadow of a home-made sundial to determine true north and a compass pointing to magnetic north to determine the angle of declination in three different geographic locations (Irvine, CA; Riviera, TX; Cabo San Lucas). I set up a Foucault's pendulum in these three locations and based upon the speed of rotation, calculated the latitude by $\sin(\text{latitude}) = (\text{rotation in degrees per hour}) / 15$. Four of the five pendulum trials for each location used this formula (one was considered an outlier and not used) and then they were averaged. Results Irvine, CA has an actual latitude of 34.0 and longitude of 118. I calculated a latitude of 35.03 and a longitude of 117. Cabo San Lucas has an actual latitude of 22.5 and longitude of 109.5. I calculated 24.33 and 109. Riviera, TX has an actual latitude of 27 and longitude of 98. I calculated 25.6 and 97.5. Conclusions/Discussion One can calculate his/her position on the globe using a compass and a sundial to get the degrees of declination and using a Foucault pendulum to find one's latitude. Of the three measurements needed to determine one's position, magnetic north and true north are more easily measured than the rotation of a pendulum. A more accurate determine of one's location could be made with a much larger and heavier pendulum. (Foucault's original pendulum was 67 meters tall and weighed 28 kilograms.) While this method of finding your location could have been used for centuries, I could find no evidence that this has been done before.	
Summary Statement My project was to see if you can determine your location on the globe using only a sundial, a compass and a Foucault's pendulum.	
Help Received A friend helped me build the pendulum; Dad & my brother helped set up the pendulum in each location, Mom helped with typing for report and board.	