



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Melissa A. Medina	Project Number J0124
Project Title How Do Marble Mass, Water Density, and Temperature Affect Wave Speed?	
Abstract Objectives/Goals The objective of my project is to determine how marble mass, water temperature and density affect the speed of a wave. In experiment one, i predict that as the marble's mass increases, the speed of the wave would also increase. Next, in experiment two, I predict that the temperature of the water would have no effect on the wave speed. Then in the third experiment, I predict that as the density increases, the wave speed would decrease. Methods/Materials During experiment one, three marbles with masses of 4.9 grams, 19.2 grams, and 51.2 grams were dropped one by one, 25 times from eighty centimeters above the water. The wave made by the marble's impact was measured in seconds, as it traveled eighty centimeters. In the second experiment, the only variable that changed was the temperature of the water, which was 28 deg. Celsius, 36.3 deg. Celsius, 38.7 deg. Celsius, and 43 deg. Celsius, and, only the marble with the mass of 19.2 grams was dropped 25 times. Then, in the third experiment, the densities of the water changed, 1.0 gm/mL, 1.12 gm/mL, 1.28 gm/mL, and 1.40 gm/mL, and the marble with the mass of 19.2 grams was used. Results In experiment one, when the mass of the marble increased, the average speed of the wave also increased. Then in experiment two, when the water temperature increased, the average wave speed increased too. In the third and final experiment, when the density increased, the average wave speed increased also. Conclusions/Discussion In conclusion, the results for experiment one supported my hypothesis because I correctly predicted that the bigger the mass, the faster the wave speed would be. Then for experiment two, the results refute my hypothesis because I incorrectly predicted that the temperature of the water would have no effect on the waves speed. The results fo the third experiment also disagreed with my hypothesis because of the incorrect prediction, that as density increased, the wave speed would decrease. Mass, temperature and density do affect wave speed. Their relationship is directly proportional. If one variable goes up, wave speed does too.	
Summary Statement This project investigates how marble mass, water temperature, and water density affect the speed of a wave.	
Help Received Teacher helped correct errors in the report.	