



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Shu Hee Kim	Project Number J1614
Project Title Which Roller Coaster Rolls for You?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Roller coasters are fun and exciting. But how can I determine if a certain roller coaster is more enjoyable for me? I will be determining the speed of a falling object according to which kind of slope or curve of a ramp the object rolls on.</p> <p>Methods/Materials 1) Get all materials ready. 2) Wear all necessary safety apparatus. Most important to be used during this experiment are eye goggles and rubber gloves. 3) Place metal wire so that the vertical starting point and the horizontal end point are the same length. 4) Metal wire should be bent in a concave bend unless otherwise noted. 5) No electrical equipment should be used while handling metal wire. 6) All curves and slopes (parabola, cycloid, linear slope, and convex parabola) should have the same starting point and the same ending point. 7) Place balls of the same weight and mass at the top of every curve/slope. Hold a ruler beside it to keep the balls from rolling down. 8) Set up video camera and get a timer ready. 9) Let go of ruler for the balls to roll down, exactly when the timer is pressed. 10) During Data and Analysis, select picture frames in video to use for certain times. 11) Repeat this process with a ball of a lesser weight and mass.</p> <p>Results The data acquired to create pictures were accumulated from the video tape with which I recorded the falls of every curve. From each frame, I captured the ball's location and super-imposed it on one frame. The time span of each frame is 0.14 seconds. The linear slope's speed constantly increased. The concave parabola's speed suddenly increased, but gradually decreased afterwards. The convex parabola's speed first part started slowly, but dramatically increased at the fall. The cycloid's speed maintained the same speed throughout the fall.</p> <p>Conclusions/Discussion I observed from my results and analysis that the speed of the falling ball can be controlled with the different types of curvatures. I also noticed that there is a curve that maintains the same speed of the ball throughout the duration of the fall; as conjectured, it was the cycloid. The speed of cycloid curve maintained the same speed throughout the fall. Thus, if the roller coaster is made into the cycloid curve, it'll be quite easy to ride even though it looks scary. This is the best roller coaster for little kids.</p>	
Summary Statement My project is finding a curve shape on which a ball rolls with a constant speed.	
Help Received Dad helped me with a graphic software usage and a model building.	