



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> Anshul Gupta	<b>Project Number</b>  35911
<b>Project Title</b> The Gauss Gun	
<b>Objectives/Goals</b> A Gauss gun is a device that uses magnets to launch a ball from a stack of balls. My objective is to find if the material of the ball will affect its speed from the Gauss gun? I hypothesize that the more mass a ball had the faster it would go, but its ability to be magnetized would also affect the speed. I believed that the glass ball would go the fastest than metal, and plastic would go the slowest. <b>Abstract</b> <b>Methods/Materials</b> The experiment was set up with a grooved ramp slanted upward that finally would go straight up. At the bottom of the ramp, a Gauss gun was set up using magnets and balls. I found the initial velocity( $v_0$ ) of the launched ball by measuring the height( $h$ ) it traveled, and using the equation, $v_0 = \sqrt{2gh}$ , which comes from the equations of motion for the ball moving upward against gravity( $g$ ). I had three experiments, the first two being the ones that define the control variables for the third and final experiment. The first experiment was done to find out how many metal balls behind the magnet gives the highest speed. For the second experiment, I moved the plastic and glass balls in different positions. In the third experiment I launched metal, glass, and plastic balls from the last position to see which one went the fastest. In total I had 90 trials, 35 in the first, 40 in the second, and 15 in the third. <b>Results</b> From first experiment I learned that three balls behind the magnet delivered the highest speed. Hence, for remaining experiments I used three metal balls behind the magnet. In the second experiment, I discovered that if the plastic or glass ball is the farthest from the magnet, it gives the highest velocity. In the third and final experiment, the metal ball went at the slowest speed at 137.65 cm/s, then the plastic at 216.22 cm/s, and the glass, which was the fastest, at 225.62 cm/s. <b>Conclusions/Discussion</b> I conclude that the glass ball goes the fastest, followed by the plastic ball, then the metal ball as the slowest. This is partially true with my hypothesis, which said that the glass would go the fastest, followed by metal, and plastic as the slowest. This project helps to find appropriate materials for high speed projectiles, which could be used to launch things into space.	
<b>Summary Statement</b> Choice of projectile (ball) material from a Gauss gun (a magnetic accelerator) for the fastest speed.	
<b>Help Received</b> Parents helped in setup and organization.	