

CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

Name(s)	Project Number
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	22772
Project Title	
Characteristics of Winning Pinewood Derby Cars	
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Objectives/Goals Abstract	
I want to see which characteristics (variables) have a significant effect on the ra	
Derby cars. I think that weight will have the greatest effect. Also, I think that a	streachlined car with
polished axles and the maximum amount of weight, placed in the rear, will be the Methods/Materials	ne Hastest car.
In Part I, I made eight Pinewood Derby cars that each weighed 167 grams. The	right cars werp
In Part I, I made eight Pinewood Derby cars that each weighed 167 grams. The constructed to have every combination of the independent variables of a le politication of the independent variables of a le politication.	shing (polished vt
as-received), aerodynamics (block vs. wedge), and weight placement (front ys. :	rear). I raced the cars on a
Pinewood Derby track and recorded their times using an electronic timer. Next the eight cars to 143 grams. I then raced the new cars and recorded their times.	, I adjusted the weight of
In Part II, I constructed another car and raced it over a wide weight range (45 to	190 grams) without
applying graphite to the axles. I then repeated that experiment using the same v	veight range and also
graphite on the axles.	2 2
Results	1
For Part I, the average race time was 2.886 +/- 0.007 seconds. The best car (a wedge with polished axles and 137 grams in the rear) ran 0.04 seconds faster than the average car time. The slowest car (a block	
with unpolished axles and 137 grame in the rear) was 0.04 seconds slower that the average car. By using	
the experimental design in the range initially studied. Was able to find out that aerodynamics took off	
0.008 seconds from the average time, axle pollshing took off 0.025 seconds, a higher weight took off	
0.008 seconds, and having back weight placement took off 0.008 seconds. From Part II, weight greatly	
affected the car's time up to 120 grams, but weight didn't make a significant difference afterwards. Graphite subtracted 0.8 seconds on the 45 gram car) and 0.2 seconds on the 145 gram car.	
Conclusions/Discussion	
With these results, I now have the information needed to create the ultimate Pinewood Derby car. I	
recommend building a car that is as lose to 140 grams as possible, and certainly with polished axles. All	
else being equal, it can't hurt to make it wedge-shaped and put the weight in the rear although my results don't show that these variables are very significant. Finally, always apply a generous amount of graphite	
and spin it into the axles to get a speedy car.	lerous amount of graphite
and spin it into the axies to get a speedy car.	
Summary Statement	
I systematically studied which variables affect a Pinewood Derby car's race time.	
Help Received	
My mother taught me the basic concepts of Statistical Experimental Design. M	y father helped me set up
the Pinewood Derby track and electronic timer.	