



# CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

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<b>Project Title</b> <b>The Movement of Objects through a Congested Area: Traffic Jams and Traffic Flow</b>	
<b>Objectives/Goals</b> The objectives are to find the factors that influence traffic flow, to find out how to increase traffic flow and to decrease the number of traffic jams, and to describe traffic flow in terms of physics. <b>Abstract</b> <b>Methods/Materials</b> Both a physical model and calculations were used to meet the project objectives. A mechanical model imitating traffic flow was built. 3.175 mm brass balls were used to imitate the cars and aluminum walls mounted on a board imitated different types of roads. A single lane track, a double lane track, and a double lane track that turns into a single lane track and back into a double lane track (DSD) were built. 20,30, and 40 balls were released in the single lane track and 40, 60, and 80 balls in the double lane track. These were compared to see on which of the tracks the balls would roll first into the reservoir area. For the corresponding number of balls, ten trials were made. The single lane track was compared with the DSD track by releasing 20, 30, and 40 balls in ten trials each. The numbers of cars that pass a certain point on a road in an hour (road throughput) for different speeds of the cars were calculated by using algebraic calculations. The purpose of this was to determine the speed that cars need to be traveling in order to have the most cars pass through in a given time period. <b>Results</b> For the double lane and single lane experiment, the double lane track had the balls roll into the reservoir area first most of the times (eight out of ten). For the single lane and the DSD lane experiment, the single lane track had the balls roll into the reservoir area first most of the time (seven out of ten). For the calculations, it was found that when the velocity of the cars is too high, the road throughput decreases. The road throughput is maximum at an approximate speed of 20 mph. <b>Conclusions/Discussion</b> From the mechanical model, it was concluded that if you have a mountain or something that acts as an obstruction, and you want to build a DSD lane road, traffic flow may decrease and traffic jams will occur. From the calculations, it was concluded that if cars travel at a high speed, less cars will be able to go through the road in a certain amount of time. The reason for this is that as speeds increase, the cars must maintain larger distances between them. In this project, I learned how to understand traffic flow better by using physical principles and mathematical calculations.	
<b>Summary Statement</b> In this project, a mechanical model was built and calculations were made to describe traffic flow and traffic jams.	
<b>Help Received</b> Mother and Father helped in monitoring experiments and gave advice; Neighbor helped with the project board.	