



CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

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| Name(s) Darren R. Loney | Project Number 22755 |
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| Project Title The Effect of Different Sand Barrel Arrangements on Energy Absorption upon Impact of a Car |
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| <p>Objectives/Goals The purpose of this experiment is to determine which geometric freeway barrel array is most effective, if any; the reason certain barrel arrangements are more effective than others; and why some barrel arrays are more widely used.</p> <p>Abstract The purpose of this experiment is to determine which geometric freeway barrel array is most effective, if any; the reason certain barrel arrangements are more effective than others; and why some barrel arrays are more widely used.</p> <p>Methods/Materials A ramp was constructed, resting on a long, flat board; a grid of graph paper was placed at the end of the ramp with large X and Y coordinates drawn on it. "Sand barrels" were constructed from a film canister filled completely with salt, and were marked on the lid with a "Front" and "Back" dot, placed 180-degree apart on opposite ends of the cap. One of the following four barrel arrays was placed on predetermined coordinates at the base of the ramp on the graph paper.</p> <p>Array 1: Array 2: Array 3: Array 4:</p> <pre> X X X X X X X X X X X X X X X X X X X O </pre> <p>A toy car was allowed to freely roll down the ramp and into the barrels. The new coordinates for the "Front" and "Back" dot of each displaced barrel was recorded. This procedure was repeated a total of six times for each of the four barrel arrangements. All the data was plugged into a spreadsheet to calculate midpoint for each barrel displacement and the total length all the barrels moved in each collision.</p> <p>Results Barrel Arrangement 3, the barrels in a straight line, performed the best at 41.63cm with the longest average length the barrels moved upon collision with the car. Next was Array 4 at 39.35cm, then Array 2 at 27.88cm, and followed closely by Array 1 at 27.46cm.</p> <p>Conclusions/Discussion Because energy in a system is conserved, the carefully thought out experimental design simply relied on the total distances all the barrels moved. The energy in the car stayed about the same on each roll, so longer barrel movement meant more energy taken away from the car to move the barrel with kinetic energy. This transfer of motion was key in the experiment. The cumulative addition of all the individual</p> |
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| Summary Statement This project is about determining which geometric barrel array absorbs the most energy when impacted with a car. |
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| Help Received Father helped roll the car down the ramp |
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