



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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| Name(s) Jacob A. Cohen | Project Number J1807 |
| Project Title Is London Bridge Falling Down? | |
| Objectives/Goals Determine how modifying the structure of a Howe Bridge changes the bridge's load carrying capacity. | |
| Abstract Methods/Materials Materials: Balsa/Bass wood strips; pins; wax paper; table saw; glue; sketching paper; knife; weights; cinderblocks; ruler; metal hook and bar; bucket; and scales Methods: 1. Design and build a control bridge with no trusses. Determine its load carrying capacity by placing it between two cinderblocks and adding weights into a bucket attached to the bridge until it breaks. 2. Design and build a Howe Truss Bridge with 10 trusses and 11 truss beams. Determine its load carrying capacity by following the procedure described above. 3. Design and build variations which have different number of trusses, truss beams and materials and test their load carrying capacity. Altered variables were the number of trusses, the number of truss beams, and the type of wood. | |
| Results The Control Bridge had no trusses, held 13.5 pounds and weighed 28.5 grams. The Howe Bridge had 10 trusses and 11 truss beams, held 35 pounds and weighed 58.3 grams. The Howe Variation 1 Bridge had 10 trusses and 14 truss beams, held 45 pounds and weighed 71 grams. The Howe Variation 2 Bridge had 14 trusses and 15 truss beams, held 85.5 pounds and weighed 79 grams. The Howe Super Bridge, which was the same as Howe Variation 2 except that it used Bass wood, held 146 pounds and weighed 118 grams. | |
| Conclusions/Discussion Adding trusses increases load carrying capacity, as demonstrated by the Control Bridge, which had no trusses and held less weight than the bridges with trusses. Increasing truss beams increases load carrying capacity, as demonstrated by the Howe Bridge, which had 10 trusses and 11 truss beams, and held 35 pound, versus the Howe Variation 1 Bridge, which had 10 trusses and 14 truss beams and held 45 pounds. Increasing trusses increases load carrying capacity, as demonstrated by the Howe Variation 2 bridge, which held 85.5 pounds and had 14 trusses versus the Howe Variation 1 bridge which had 10 trusses and held 45 pounds. Using stronger materials increases load carrying capacity, as demonstrated by Howe Super Bridge, which held 135 pounds and was the same as the Variation 2 Bridge, which held 85.5 pounds, except that it was made of stronger bass wood. | |
| Summary Statement The purpose of the project was to show how changes in bridge design can increase load carrying capacity. | |
| Help Received Mr. Hobbs (science teacher) helped me structure the report; Father helped me cut pieces for my bridges; Mother took pictures of me breaking bridges | |