



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Heidi Bishop	Project Number J0304
Project Title Shake It Up: The Effect of Temperature on Building Materials During an Earthquake	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective was to discover how different temperature building materials are affected during earthquakes.</p> <p>Methods I experimented with buildings of metal, wood, and plastic and a heat lamp and freezer made buildings hot or cold. A digital thermometer measured temperature as buildings were attached onto a shake-table. I shook the shake-table and recorded data using an accelerometer. Each building was placed in the freezer for 60 minutes. The building s temperature was taken; it was attached to the table, shaken, and data recorded. This repeated every 10 minutes until the building was back to room temperature. The procedure was then repeated using a heat lamp.</p> <p>Results For cold, the metal building s temperature ranged from 11°C to 21.9°C. Acceleration ranged from -18.4 to 19.8 m/s². For warm, it ranged from 22.3°C to 51.2°C. Acceleration ranged from -17.2 to 19.1 m/s². For cold, the wood building s temperature ranged from -10.0°C to 22.3°C. Acceleration ranged from -9.9 to 8.4 m/s². For warm, it ranged from 21.1°C to 81.6°C. Acceleration ranged from -17.8 to 10.5 m/s². For cold, the plastic building s temperature ranged from 0.9°C to 24.8°C. Acceleration ranged from -13.8 to 16.0 m/s². For warm, it ranged from 20.9°C to 32.5°C. Acceleration ranged from -12.9 to 14.5 m/s².</p> <p>Conclusions My hypothesis was that if the temperature of a building s material rises, then it will have more movement when shaken during earthquakes. Data showed metal and plastic buildings didn t follow my hypothesis and the wood building did, proving my hypothesis partially correct. Metal building moved most during earthquake simulation, but wasn t affected by temperature. Wood building moved the least, but showed more movement as temperature rose. Plastic building s results varied. Data led to the conclusion that wood buildings are affected by rising temperature during an earthquake. Metal buildings don t seem to be affected by rising temperature. Data for the plastic building was inconclusive.</p>	
Summary Statement As measured by an accelerometer, I found that only one of the three building materials I tested was effected by temperature during a simulated earthquake.	
Help Received My parents provided the supplies needed for me to do my project and my grandpa helped me build the shake table.	