

# Building Shaking - Variations of the BOSS Model

The rolling motion of a seismic wave may move at the same frequency of a building called resonant frequency. A building's architectural design, height (how many stories), and construction materials affect resonance. Buildings engineered with earthquake shaking in mind will withstand resonance and serious damage. This model demonstrates that smaller, faster motions have resonant frequencies closer to a shorter building's resonant frequency. Longer, slower resonant frequencies are closer to that of taller buildings.

## Learning Objective:

- Students will investigate how seismic energy enters a structure and explain how resonance affects building oscillation.

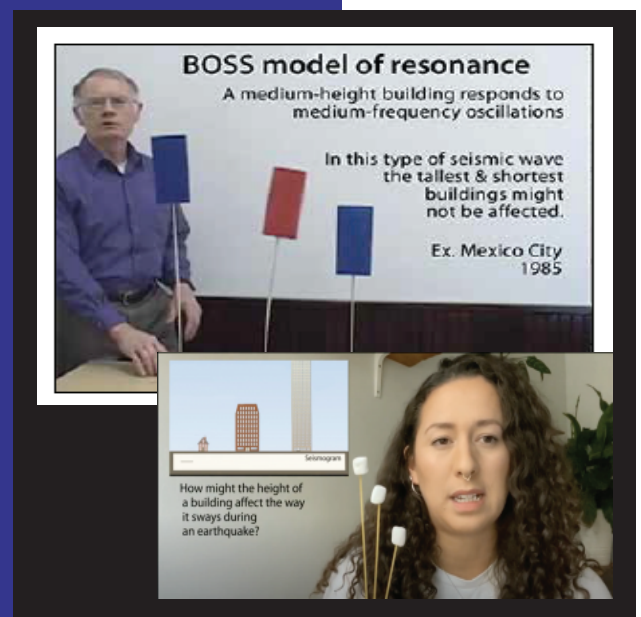
## Steps

Step 1: **Phenomenon:** Ask, "Why do buildings of different heights respond differently in the same earthquake?"

Step 2: **Test resonance:** Students use raisins or marshmallows and spaghetti to build/compare "buildings" of different heights and observe which oscillate most under certain shaking conditions.

Step 3: **Link to Engineering:** Ask, "What design changes reduce resonance impacts?"

Step 4: **Synthesize:** Students create a rule-of-thumb statement about height/design and shaking response.



Also featured in an activity

POWERED BY  
**ShakeAlert**

- To make only one of the buildings oscillate or oscillate more, try to move the base with the "building's" frequency
- NGSS: MS-ESS2-2, MS-PS4-2, HS-ESS3-2, HS-ESS4-1, Developing and Using Models, Cause and Effect



Find more at [earthscope.org](https://earthscope.org)!

