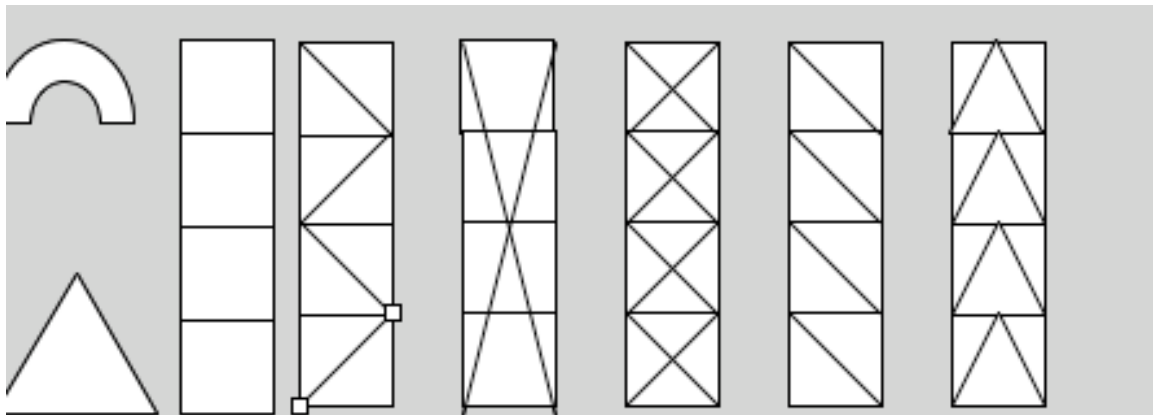
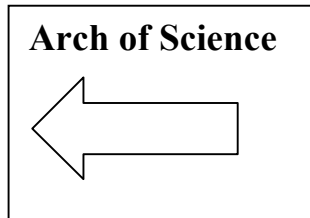


## Earthquake Structures Lab II


### Background

To reduce earthquake damage, new buildings must be made stronger and more flexible. Older buildings must be modified to withstand stronger quakes. A structure must be strong in order to resist violent shaking in a quake. It must also be flexible so it can twist and bend without breaking. Brick buildings as well as some wood-framed buildings may collapse if their walls have not been reinforced, or strengthened. Anchoring foundations to solid rock below the soil can reduce liquefaction. Shock absorbers, like water or springs for buildings and flexible joints for gas and water lines can also help to absorb the vibrations of an earthquake. Shear support designs, heavy bases, geodesic domes, base-isolated buildings, and pyramids are all designs people have developed to increase strength and flexibility in structures.


Where have all the arches gone? Arches are curved structures that support the weight of material over a space. Arches span an opening in such a way as to transfer the load to lateral thrust on either side of the opening. This increases the ability of a structure to support a load. The Romans of ancient history incorporated the arch shape in triumphal arches such as the Arch of Titus. Arches are often incorporated in modern structures such as arch bridges.



**Required Materials:**



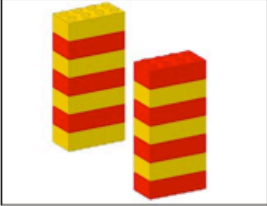
dictionary




25 - 2x4 bricks

1. Stack seven 2x4 bricks on top of one another. Create a second stack of seven 2x4 bricks.
 


Check off when complete


2. Place two, 2x4 bricks cantilevering out from each of the stacks.
 


Check off when complete


3. Carefully place two 2x4 bricks cantilevering out from the previous 2x4 bricks.
 

Check off when complete



4. Attach the two sets of cantilevers with two 2x4 bricks. Cap the arch off with a single 2x4 across the top.
 

Check off when complete


5. Attempt to place a dictionary on the top of the arch.
 

Check off when complete


Does the arch support it?



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## Materials

- Lego
- Shake table

## Procedure

1. After building your structure, you must test it with the shake table.
2. Shake the building at three frequencies, low, medium, and high. Record data.
3. Shake the building at three amplitudes, low, medium, and high. Record data.
4. Add a small 1g weight to the building and shake at the low frequency.

## Data

Please check the earthquake –proof architecture technique that you employed:

- Flexible (bends without breaking)
- Shear wall (strengthens, reinforces walls)
- Anchored Foundations (to solid rock below the soil to reduce liquefaction)
- Shock absorbers (like water or springs to absorb vibrations)
- Shear support designs like heavy bases or base isolated buildings
- Geodesic dome
- Pyramid
- Pagoda
- Arches

