

Earthquake Simulation Lab

Introduction:

To better understand the way in which structures respond to severe earthquakes, you will investigate the seismic behavior of buildings. In teams of 3 you will design and construct a model building according to specific requirements. Each structure will be experimentally tested by subjecting them to simulated earthquakes on a shake table.

1. Your **first** task is to meet with your group, decide on a name for your company, **and** agree upon who assumes each job:

- **Architect (A):** the architect wants to make sure that the building is functional and beautiful.
- **Engineer (E):** the engineer works with the architect to have the building survive the largest earthquake... how do you balance the building's size and height?
- **Builder (B):** the builder has to lead in the construction a building that makes the owner, the architect and the engineer happy;
- **Task Manager (M):** makes sure that everyone is staying on task, manages materials and supplies.
- ****Each role has a separate scoring rubric.**

2. Discuss with your group the type of building you would like to construct:

- **(E)** Help your engineer to develop and record one or more hypotheses regarding which features are most critical for a building to survive an earthquake.
- **(A)** Have your architect sketch your ideas for the building on paper and write a brief description of the features included.
- **(B)** Finalize your building plans as a team **before** starting construction.
- **(M)** Confirm that you will have enough supplies to construct your building.

STOP! *Present your company name, roles, hypothesis and architectural design to your teacher before moving on to the construction phase.*

3. Construction should not begin until you have formulated and agreed on a plan. You will have limited supplies to construct your building so...**measure twice, cut once!**

4. You will have the following materials:

- 12 index cards
- 100 cm Masking Tape
- Scissors
- 30 cm ruler

Building Requirements

The building must be:

- at least 30 cm high
- at least 3 stories
- no central post or uprights

Earthquake Simulation Lab Report Form

(B) Company Name _____

- **(A) Architect:** _____
- **(E) Engineer:** _____
- **(B) Builder:** _____
- **(M) Manager:** _____

(E) What features are most critical for a building to survive an earthquake? Hypothesis:

(A) Draw a sketch of your building design AND write a few sentences explaining the features of your building and why they are important.

Conclusion Questions: (Neatly answer the following questions on a separate sheet of paper.)

(E)1. What did you choose as the most important feature(s) of your building? Did this feature(s) perform they way you predicted? Explain.

(A)2. Analyze how your building was able to withstand the earthquake. What happened? Did anything unexpected occur? How did your building compare with the other buildings? Looking back, what could you do to improve the design of your building?

(B) 3. Apply this knowledge to buildings in general... what would you recommend to someone wanting to create their company's new headquarters building in San Francisco along a fault line?

(M) 4. Why does the U.S. have less damage and fewer fatalities following major earthquakes as compared to other countries (i.e. Haiti?)

Scoring Rubric

(A) Architect

- (10) Building Design (neat, accurate)
- (10) Description of Design features
- (10) Habits of Mind
- (10) Question

(E) Engineer

- (10) Hypothesis
- (10) Function (Does the building sustain damage? How much?)
- (10) Habits of Mind
- (10) Question

(B) Builder

- (10) Construction (neat, accurate)
- (10) Habits of Mind
- (10) Question

(M) Materials Manager

- (10) Building meets requirements
- (10) Habits of Mind

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Earth Science

(10) Question