

Unit Handout
3 124

XPT: Earthquake Towers

Purpose: Design and build a model tower that can withstand as high of a magnitude possible of a simulated earthquake.

Guiding Questions: How do architects and engineers design and build structures that are as resistant to earthquakes?

Goal: Your goal is to design and build a a tower that is as resistant to a simulated earthquake.

Grading: You will be graded on:

- the justification for your tower design
- the accuracy of your design (meeting the building requirements)
- the accuracy of your built tower (meeting the building requirements)
- (possibly) a reflection on how tower design is correlated to its resistance to the simulated earthquake

You will not be graded on how well your building survives the simulated earthquake.

Building Requirements: Your building must be built to the following specifications.

Scale: 1 inch on the tower = 10 feet.

1 story = 10 feet

1 grid square = 3mm² (3mm x 3mm).

Width/depth of the balsa wood: 3mm

Tower base block: 95mm x 101mm

Each team receives: 1 foundation block, 1 connecting block, 5 floor plates, 18 pieces of balsa wood, wood glue, timber cutter, wax paper, foam board, up to 2 sheets of grid paper, and t-pins.

1. The minimum height of the structure is 10 stories.*
2. The maximum height of the structure is 20 stories.*
3. The exact width of the structure is 40 feet.
4. The exact depth of the structure is 40 feet.
5. The base of the tower on your design shows the short side of the tower block.
6. The number of wooden floor plates used is 5.
7. The floor plates are evenly spaced along the height of the structure with one on the top of the structure.
8. One floor plate must be on the top of the structure.
9. Each story supports 600g of mass, which includes the plate, blots, and mass plates.
10. Each section (between floor plates) is cross braced.

* Not including the connecting block.

The general plan (subject to change) is included on the next page.

Day 1 (Friday, May 29th)

- Discuss how the project will be graded.
- Go over project requirements.
- Look at materials used to build the tower.
- Watch how the towers are constructed.

Day 2 (Monday, June 1st)

- Form teams of 4 students each (7 teams maximum)
- Research design ideas.
- Decide on the general design of your tower.

Day 3 (Tuesday, June 2nd)

- Draw the design for your tower following all building requirements.
- Write a justification for your design. Explain why you believe your design will be able to withstand a simulated earthquake. This mostly focuses on your choice of design for the cross bracing.
- Submit your design and justification for grading.

Days 4-6 (Wednesday, June 3rd - Friday, June 5th)

- Begin building your tower.

Day 7 (Monday, June 8th OR Wednesday, June 10th)

- When your tower is completed, have it graded.
- Put the towers to the test! Let's see how well they do!