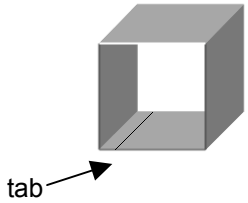
Tall Buildings & Earthquakes
Worksheet 1

Investigation
How do three buildings of different designs behave under earthquake conditions? What characteristics or key features affect the performance of buildings in earthquakes?

Model Construction
Each building consists of five floors but the way they are constructed represents different structural constraints and construction methods.

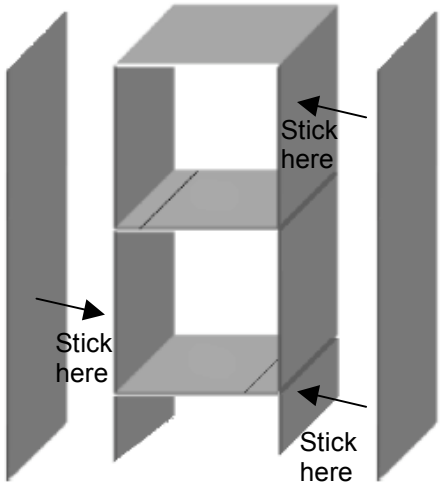
Building 1
Floors:

1. Cut along the solid lines and fold along the dashed lines the parts marked 1a.
2. Fold each strip so it forms a hollow cuboid and stick the tabs in place. You should now have five separate cuboids.



Walls:

1. Cut out the parts labelled 1b.
2. Pile up the cuboids on top of each other and stick alternate ones to each wall.

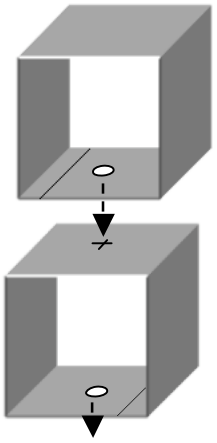


3. Then stick the top of the wall to the top floor roof so that it is held firmly in place.

Building 2

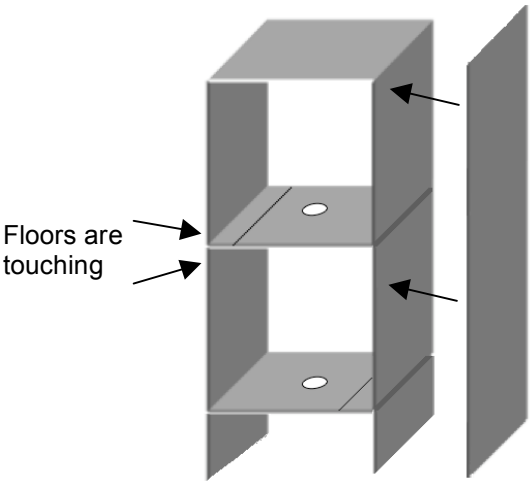
Floors:

1. Cut along the solid lines and fold along the dashed lines the parts marked 2a.
2. Make small holes in the strips where indicated by a cross.
3. Fold each strip so it forms a cuboid and stick the tabs in place. You should now have five separate cuboids.
4. Use the fasteners to hold the cuboids together as shown in the picture. For a more stable building alternate which side of the building the tab is on and make sure you don't get confused with the top and bottom floors.



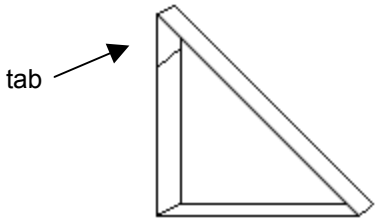
Walls:

1. Cut along the solid lines the parts marked 2b.
2. Either sellotape the walls to the sides of the floor cuboids or use double-sided tape. It is very important to hold the floors together whist sticking the wall in place so that each floor is flat against the next one's ceiling and there are no gaps.

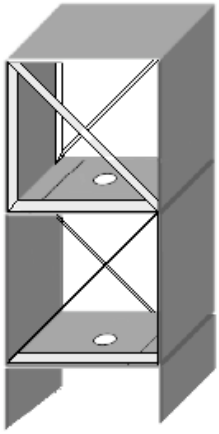


Building 3

1. Repeat instructions for Building 2 using parts 3a and 3b.
2. Now cut and fold parts 3c.
3. Stick down, using the tabs so they form ten triangular bracing members as shown below.



4. Place and stick one member on each side of the building at each floor level. Make sure that the bracing members are in alternating directions both on the front and back of the building and on each floor.



Testing

Sellotape two pencils approximately 4 cm apart and parallel to each other on a tray. Stick some doubled-over sellotape in the centre of the gap. Stick a building on top of the sellotape so that the walls are touching the pencils. Gently shake the tray from side to side at right-angles to the pencils. Increase the frequency of shaking to approximately 2 shakes a second and observe the effects.

Answer the following questions:

1. What happens to building 1 during the earthquake?

2. What happens to building 2 during the earthquake?

3. What happens to building 3 during the earthquake?

4. Compare the behaviour of the three buildings, which one would be safer to build in an earthquake zone?

5. What features make this building the safest?