

Spaghetti Challenge

Objectives:

- Stimulate creativity
- Experience the resistance of a construction to shocks

STEP BY STEP

Before starting

The teacher introduces the activity by showing a short video on the effects that earthquakes of different intensities can have on a building.

What damages?

After watching the video, the teacher explains that while it is true that on the hazard of an earthquake we cannot do anything about it, there are construction strategies to contain the damage that buildings can suffer.

There are two main components to look at, which can combine to determine the extent of damage:

- **Type of shaking:** if the shocks are horizontal, the building will sway from side to side, while if the shocks are vertical, it is likely that the structure will begin to twist. A structure that can withstand the shocks of an earthquake without sustaining damage is called earthquake-resistant (you can find the definition in the glossary).
- **Construction characteristics:** the resistance of a structure depends on many factors, among them are the age of the building, the quality of construction, and the materials used. Generally among the

materials used, wood and steel are more resistant during shaking because they are more flexible while bricks and stones are less so.

For newly constructed buildings, there are earthquake-resistant regulations. For those already built, however, what can be done?

To protect existing structures, their resistance must be increased. Among the various techniques, two make it possible to decrease the amount of energy released by the tremor that can be absorbed by the structure causing its collapse or damage.

These techniques are the presence of *isolators*, which precisely isolate the base of the structure from the ground, and *dissipators*, which function as true shock absorbers and under seismic action absorb large amounts of energy, limiting its transmission to the structure.

Shake-proof

At this point the teacher proposes to experiment with the effects of an earthquake from constructions made from...spaghetti! The class is divided into groups, and each group will have to build a tower made of spaghetti that must be at least 30 cm high and resistant to shaking.

Each group will be provided with spaghetti, paper tape and plasticine. The teacher may decide to show this video in class to illustrate how to build the tower:

Here comes the earthquake

Each group will have 30-40 minutes to make their own tower and place it on the desk. Once all the towers have been made, the teacher will have the task of simulating an earthquake tremor, shaking the desk

first from side to side and then up and down, gradually proceeding with greater intensity.

Everyone who can build a shake-resistant tower that is at least 30 cm high wins the challenge.

Concluding thoughts

With the teacher's guidance, the class reflects on the strategies adopted to build the resilient towers and what could be the improvements to the towers that did not withstand the shocks that would make them "earthquake-resistant".