

Earthquake-Resistant Structures

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Specialized tools/technology used	Experience level required
Craft materials	beginner
Google slides	beginner

Grade Level (of this example): 3 -6

Time required: 4-6 hours

Content Standards (of this example):

ELA - Informational writing, oral presentation

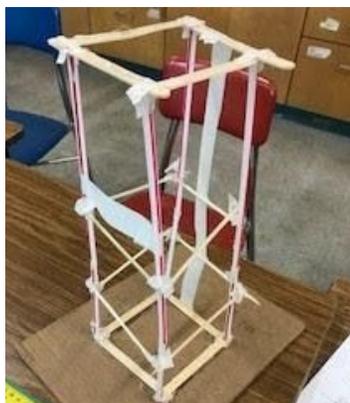
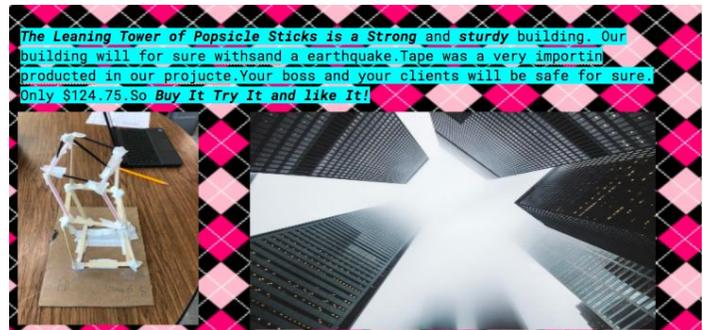
Math - Using arithmetic to solve problems about money

STEM - Earthquakes and impact on human environment

Summary of Project:

Designing an earthquake resistant structure was a culminating activity to a weathering and erosion unit. Students worked in groups to review prior learning about earthquakes before designing, building, and testing their structures within assigned parameters. At the end, students designed a Google slide to advertise their structure.

Examples of structures and slides





Notes from contributor:

Designing an earthquake-resistant structure was a day-long design process activity at the end of a weathering and erosion unit. (The 4-6 hour time estimate for the activity reflects only the time spent during this final build day.)

At the beginning of the day, the entire 4th grade met to review their knowledge of earthquakes and their effects on the environment, to introduce the task, to **Ask** questions, and to learn about the criteria. Some of the criteria involved a minimum and maximum size, a minimum number of stories for the structure, material choices, and a budget. (45 minutes)

Students worked independently to **Imagine** two different structures (20 minutes) and then met with their team mates. Groups then collaborated to create one **Plan** and created an invoice for their materials within their budget (45 mins).

After their invoice had been checked by an adult, students gathered materials, **Created** their structure, tested it, and **Improved** it as necessary (60 mins). Each structure was tested on an "Earthquake Shake Table". The structure had to withstand 10 shakes of the table - wobbling was okay, but all parts of the structure had to remain intact.

At the end of the day, students designed a Google slide to advertise their structure. (45 mins)

STEM and ELA standards addressed by building the model:

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Use the four operations to solve problems involving distances and money.

Evaluate different solutions to reduce the impacts of a natural event such as an earthquake

Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a model or prototype.

Evaluate relevant design features that must be considered in building a model or prototype of a solution to a given design problem.

ELA and STEM Content Standards addressed by Google Slide:

Interpret information presented differently (visually, orally, quantitatively) and explain how the information contributes to an understanding of the text.

Write informative/explanatory/opinion texts to convey ideas and information clearly.



Spotlight on collaboration:

This activity was completed during an all day fourth grade STEAM day.

Fourth grade at the Page School is normally departmentalized like a middle or high school. Daily core subject classes are divided into three blocks daily: Math, ELA, and STEAM (science and social studies). Students travel with their homerooms to each subject. For STEAM day, students were grouped heterogeneously across homerooms in order to place them with students they did not normally get a chance to work with and assigned a room to work in during the collaborative steps of the Engineering Design Process.