**Lesson Plan**

**Subjects: Algebra/Geometry/Physical Science** (8th-12th grades)

**Lesson Focus:** Earthquakes **Time:** 30 min - 2 hours

**Presenters:** Dr. Shahram Pezeshk and Ali Hajihashemi (grad student)

See Speaker Bureau for contact information.

**Course Level Expectations (Algebra I and II):**

CLE 3102.1.7, CLE 3102.3.7, CLE 3102.3.9, CLE 3103.1.7, CLE 3103.3.4, CLE 3103.3.5

**Course Level Expectations (Geometry):** CLE 3108.1.7, CLE 3108.2.3, CLE 3108.4.4, CLE 3108.4.7, CLE 3108.4.8

**Course Level Expectations (Physical Science):** CLE 3202. Inq.2, 3,4,5,6; CLE 3202.T/E.2; CLE 3202.Math.2; CLE 3202.3.1; CLE 3202.3.2; CLE 3202.3.3; CLE 3202.4.1; CLE 3202.4.2; CLE 3202.4.3

**Materials (for presentation):**

 “How Earthquake Happens” PowerPoint

“Earthquake -LIVE, IRIS Website” (See tabs.) Demonstration devices: Slinky, Geophones, Oscilloscope, Drum device, IPhone APP, Shake table,

**Materials (per group):** K’NEX parts, Build #1(26 red beams, 4 orange beams, 16 blue joints, and 4 gray joints), Build #2 (Add 2 orange and 2 gray beams.

**Teaching the Lesson:**

1. Recommendation: Invite Presenters from University of Memphis Herff College of Engineering or Earthquake Research Center to make presentation and provide devices for demonstration.

2. Use “How Earthquake Happens” PowerPoint to present types of earthquakes, scales and devices that convert ground motions into waves.

3. Use slinky to demonstrate P-Waves(Primary) and S-Waves (Secondary or Sine wave)

4. Demonstrate the various devices used to record seismic activity.

**CHALLENGE #1**

Build a 4-story structure with Columns, Beams, and Joints, using the following KNex parts:

 First structure: 26 red beams, 4 orange beams, 16 blue joints, and 4 gray joints.

**Goal:** Make the tower stable in both directions, as described below.

**Gravity (Vertical) Loads**,such as materials, furniture, snow, and **Lateral Loads**, such as wind and earthquakes.

Look at how the structure reacts to earthquake in 2 directions, x and y.

Keeping the original structure the same, add 2 orange and 2 gray beams in order to strengthen structure in both directions, as needed. Experiment with various placements for optimal results.

**Closing Activity:** Journal writing-Have students reflect on their method(s) of problem solving and communicating. What could they have done differently to improve accuracy and efficiency?**Extension:** Provide a “Parts List” to each group with prices for K’NEX pieces. Have students determine the cost of their structure and make changes to lower the cost, but still maintain accuracy of functions.

<https://www.iris.edu/hq/>

https://www.earthscope.org