

SHAKE IT UP (LEVEL 2)

Description	Learners will begin to understand the way the Earth is designed as tectonic plates, how mountains form, what earthquakes are and how we respond to them!
Leading Question	How would you keep your community safe if there was an Earthquake?
Total Time Required	4 hours total over 5 days
Supplies Required	Pens – Paper, Orange Plastic covers of containers, A large tub Cardboard, Scissors, Styrofoam, Glue 2 desks or tables, 1 coin, Pencil or Marker A stack of heavy books, A ruler, A piece of cardboard, 3 rubber bands, and paper Preferred: A World Map
Learning Outcomes	<ol style="list-style-type: none"> 1. Exploring tectonic plates and layers of the Earth 2. Understanding the movement of the tectonic plates 3. Formation of geographical features 4. Earthquake resistant structures 5. Identifying earthquake preparedness protocols
Required Previous Learning:	Basic knowledge on the world map

DAY 1

Today you will learn about the earth!

Suggested Duration	Activity and Description
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<p>10 minutes</p>	<ul style="list-style-type: none"> ● Reflect on how they think the Earth's surface and continents are formed. <ul style="list-style-type: none"> - Understand that our Earth is made up of slowly moving pieces called plates that are floating on a hot liquid. Our homes and even our oceans are on top of these plates, which are on top of this hot liquid. - These have moved over the millions of years to form the Earth with its continents, oceans, mountains and ridges as we know it today.
<p>10 minutes</p>	<ul style="list-style-type: none"> ● Take an orange that represents the Earth, they will tear pieces of the peel – each of the peel pieces represent one plate and the orange below represents the hot liquid underneath
<p>10 minutes</p>	<ul style="list-style-type: none"> ● Take a few small plastic covers (or any material that floats) and float this on a tub of water. The way these plastic covers move like the Earth's plates move but much more slowly
<p>10 minutes</p>	<ul style="list-style-type: none"> ● Reflect on the fact that the land they stand on is moving and how slowly it moves that they cannot feel it
<p>20 minutes</p>	<ul style="list-style-type: none"> ● Measure the impact of Earthquakes by designing their own Seismograph instruments. ● Place the tables or desks side by side. Stack the books on top of the piece of cardboard on one desk. Insert the ruler or any long thin stick between two books near the top of the stack. The ruler should stick out over the adjacent desk. ● Hang the pencil or marker from the end of the ruler using the three rubber bands and the coin if needed for extra weight. The marker or pencil should touch a piece of paper placed under it on the adjacent desk when the cardboard is moved. The first desk represents the place where the earthquake is occurring. ● A family member can make the earthquake occur by shaking the cardboard back and forth towards the second desk. The pen will move as this earthquake occurs. The second desk represents the recording station. Record the earthquake by slowly pulling the paper underneath the marker while the cardboard is being shaken. ● This record that the seismograph creates is called a seismogram. ● Simulate 3 to 5 earthquakes and then make a hypothesis on reading the seismogram. ● Hint: the tallest wave represents the earthquake with the maximum intensity (or magnitude).

DAY 2

Today you will learn about how the earth can be like a puzzle.

Suggested Duration

Activity and Description

30 minutes

- Draw and design your own map of the Earth as a jigsaw puzzle with 8 pieces on Styrofoam or Cardboard (representing the 8 large plates). Draw this based on the below or your own imagination of the various continents



10 minutes

- Paint over their world map with blue representing the oceans and label the ones that they know

10 minutes

- Depict the continents and land in green or a chosen color and label the ones that they know.

DAY 3

Today you will understand how earthquakes and mountains are formed.

Suggested Duration

Activity and Description

15 minutes

- Place your hands-on top of each other palms facing downwards. The palm of your upper hand should be touching the back of their other hand. Now rub your hands in this position and notice how your left hand moves to the right and right hand moves to the left. This heat created when the hands rub represents the friction created when the pieces slide over each other. In most cases this creates an earthquake as the crust shakes
- Explore how mountains are formed, which happens when two plates bump into each other

15 minutes

- Hold up both your hands touching at the fingertips as shown in step 1. Each of your hands represents a different tectonic plate. Then push your hands together from their wrists as shown in step 2 and observe how

your fingers move upward to form a mountain as shown in step 3 (see images below for clarification). This is representative of two plates colliding with each other – this is how the Himalayas and other mountains were formed when plates crashed against each other

Step 1:



Step 2:



Step 3:



15 minutes

- Try and draw the two types of movements and the geographical features that are created

DAY 4

Today you will create structures that are Earthquake resistant.

**Suggested
Duration**

Activity and Description

10 minutes

- First write your hypothesis on whether shorter or taller buildings are more Earthquake resistant. Prompt: Have you ever climbed a tree? When it is windy, what part of the tree shakes more?

- Hint: All buildings shake at the same frequency as the shaking of the Earth, but the movement is magnified as the building gets taller.
- Make your own shake-tables to learn about strong and weak buildings through experimentation. Build a paper house can from 3-cm wide strips of paper, scissors, and tape, as shown in the figure.



10 minutes	<ul style="list-style-type: none"> ● Insert your hands into the base of the building and slide the building back and forth to see how the paper house sways and even collapses. Using extra sheets or paper, then experiment with methods of strengthening their building by cutting out and taping paper walls, paper X shaped braces, or interior columns to their building. ● Older students can try building houses of two or three stories to determine how height effects a building in an earthquake or cyclone
40 minutes	<ul style="list-style-type: none"> ● Use Styrofoam (thermocal) as a base and construct a tower of any materials available at home such as paper or plastic cups ● Design two towers: <ul style="list-style-type: none"> - The first tower will be deeply embedded into the base and have a broader base. Learners can use toothpicks, pins etc. to secure the tower into the base. - The second tower will not be as embedded into the base and has a narrower base
10 minutes	<ul style="list-style-type: none"> ● Try and shake the Styrofoam base to test which of the towers will not fall during an Earthquake.
10minutes	<ul style="list-style-type: none"> ● Reflect on what makes towers more resistant and write this down

DAY 5

Today you will think of ways to react in an earthquake.

Suggested Duration	Activity and Description
20 minutes	<ul style="list-style-type: none"> ● Design your community emergency plan in the case of an earthquake.

- Identify the potential dangers around them in times of an Earthquake. Imagine a violent shaking of the ground for a prolonged period of time, what would be hazards in their home?
- Prompts: What are the household items that are loosely attached and can fall easily? E.g. lose furniture etc. What are the items that can cause injury? E.g. hanging lights, windows etc.? What items have wheels and might move and hurt individuals?
- Make a list of the items in their home and decide how to make your home safer. Draw three columns: 1) Household item, 2) Danger posed, 3) If an earthquake occurs: move, relocate, attach, anchor, replace, remove, fasten, secure, tie down, eliminate and change

No	Household Item	Hazard Posed	If an Earthquake occurs
1	Heavy Books on the Shelf	Heavy items can be displaced and can fall	Move the heavier items to the lower shelf
2	Hanging Glass Chandelier	Glass can be injurious	Secure the light and move bed or table from under this light
3	Lose Chest of Drawers	Not attached to the wall and can fall	Attaching the cabinet to the wall

20 minutes

- Make a plan for your family with suggested changes to ensure they are aware of the hazards.
- Create a plan for evacuation or staying safely at home during an earthquake
- Given that earthquakes can last as long as 2-3 minutes and be followed by aftershocks or smaller earthquakes, what would you consider the correct safety protocol to be?

15 minutes

- Share your understanding of earthquakes and your emergency preparedness plan with their families and reflect on the changes to be made in your homes.

ASSESSMENT CRITERIA

- Understanding of plates and their movement and how that creates earthquakes.
- Representation of how geographical features are formed.
- Designing maps and jigsaw puzzles.
- Drawing up the emergency preparedness plans.