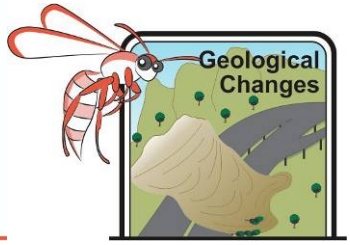
Shaky Science – Student Activity



Scientists need to measure earthquakes because increasing frequency or increasing intensity can indicate that a major volcanic eruption could be on its way.

In the past, a simple scale of intensity was created based on human observations on what happened when the Earth shook:

The Modified Mercalli Earthquake Scale

1. Not felt by humans unless in tall buildings but noticed by some animals.
2. Felt indoors by a few people, especially on upper floors. Doors may swing.
3. Felt by many people indoors. Vibration like a lightly loaded truck passing. Hanging objects may swing.
4. Most people indoors and some outdoors feel vibrations like a heavy truck passing. Dishes rattle, hanging objects swing and parked cars rock slightly.
5. All indoor and many outdoor people feel shaking, with some frightened. Buildings tremble and windows may crack. Small objects may fall and hanging objects swing.
6. Everyone feels shaking. Many are frightened and unsteady during shaking. Bells may ring and some damage of poorly built buildings, cracked plaster is more common. Many broken dishes and windows.
7. General alarm as people run outdoors, finding it difficult to stand. Waves appear on bodies of water and more buildings are damaged, including internal plaster falling and many windows breaking.
8. Alarm approaches panic. Trees shaken so much that branches break off. Strong buildings are damaged and ordinary ones partially collapsed. Water and mud may be ejected from ground.
9. General panic. Ground is cracked and even strong buildings are badly damaged. Buildings shift from foundations and underground pipes may be broken.
10. Large cracks in the ground, landslides and changed water level in wells. Severe damage to wooden structures, while most brick buildings are destroyed. Underground pipes torn apart.
11. Great damage to dams and wooden structures. Bridges fall down. Large landslides and possible tsunami (depending on location of earthquake focus).
12. Total destruction. Land and rockslides, waterways changed and objects thrown up into the air.

Can you think of any advantages of using this scale? _____

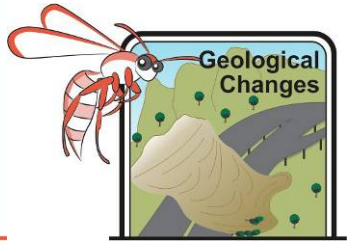
_____

_____

Can you think of any disadvantages of using this scale? _____

_____

_____



Shaky Science – Student Activity

The **RICHTER SCALE** was developed in the 1930s. It measures the largest amplitude of seismic waves on a recording. This was most effective for regional earthquakes with a magnitude of M5 or less. Seismologists now use the **MOMENT MAGNITUDE SCALE** (MMS). The MMS uses more information to calculate the energy released during an earthquake. It considers the physical properties of the underlying rock as well as the movement caused by seismic waves. The logarithmic scale means that for every unit increase in magnitude, 31 times more energy is released by the earthquake.

Inertia

We use pendulums to detect earthquakes because their relatively large mass makes them reluctant to move. This phenomenon is known as **inertia**. You may have felt the effect of inertia when a car suddenly accelerates and your head is pressed back into the seat because it does not move as fast as your body, which is more firmly attached to the car by a seatbelt.

Inertia Demonstration

Your teacher will demonstrate inertia using a plastic container, pendulum and water. Write down your observations in the space below.

_____

_____

_____

_____

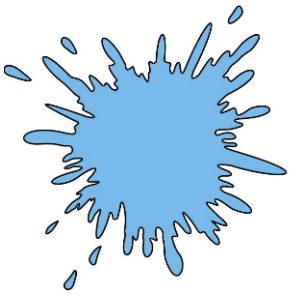
_____

_____

Seismic Splash

Materials

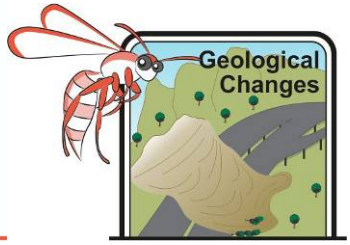
- A plastic container for water
- A pencil
- An outside cemented area
- Water



Method

Method

1. Place container on cemented area.
2. Fill container to the brim with water.
3. Sharply tap the bottom of the container with the blunt end of the pencil.
4. Observe what happens and the splash pattern.
5. Repeat to ensure reliability.



Shaky Science – Student Activity

Observations

What happened after the container was tapped? _____

_____

What happened when you repeated the activity? _____

Which variable or variables did you change? _____

Which variable or variables did you keep the same? _____

_____

Discussion

Could you use a container of water to find the direction of the epicentre of an earthquake?

_____

How could you estimate the energy released by the earthquake using this equipment?

_____

_____

Vocabulary	Earthquake, seismic energy, epicentre, seismic scale