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LESSON NOTES

WORKSHEET 19

YEAR 12: GEOGRAPHY

NAME: _____

Strand	2.1 Natural Hazards
Sub Strand	<u>12.1.1.2</u>
Content Learning Outcome	The types of Hazards

Earthquake

An earthquake is the result of a sudden release of stored energy in the Earth's crust that creates seismic waves.

Earthquakes are accordingly measured with a seismometer, commonly known as a seismograph.

The magnitude of an earthquake is conventionally reported using the Richter scale or a related Moment scale (with magnitude 3 or lower earthquakes being hard to notice and magnitude 7 causing serious damage over large areas).

At the Earth's surface, earthquakes may manifest themselves by a shaking or displacement of the ground.

Sometimes, they cause tsunamis, which may lead to loss of life and destruction of property.

An earthquake is caused by tectonic plates getting stuck and putting a strain on the ground.

The strain becomes so great that rocks give way by breaking and sliding along fault planes.

Earthquakes may occur naturally or as a result of human activities.

Smaller earthquakes can also be caused by volcanic activity, landslides, mine blasts, and nuclear experiments.

In its most generic sense, the word earthquake is used to describe any seismic event—whether a natural phenomenon or an event caused by humans—that generates seismic waves.

Most naturally occurring earthquakes are related to the tectonic nature of the Earth.

Such earthquakes are called tectonic earthquakes.

The Earth's lithosphere is a patchwork of plates in slow but constant motion caused by the release to space of the heat in the Earth's mantle and core.

The heat causes the rock in the Earth to become flow on geological timescales, so that the plates move slowly but surely.

Plate boundaries lock as the plates move past each other, creating frictional stress.

When the frictional stress exceeds a critical value, called local strength, a sudden failure occurs.

The boundary of tectonic plates along which failure occurs is called the fault plane.

When the failure at the fault plane results in a violent displacement of the Earth's crust, the elastic strain energy is released and seismic waves are radiated, thus causing an earthquake.

This process of strain, stress, and failure is referred to as the Elastic-rebound theory.

It is estimated that only 10 percent or less of an earthquake's total energy is radiated as seismic energy.

Most of the earthquake's energy is used to power the earthquake fracture growth and is converted into heat, or is released to friction.

The majority of tectonic earthquakes originate at depths not exceeding tens of kilometers.

In subduction zones, where older and colder oceanic crust descends beneath another tectonic plate, Deep focus earthquakes may occur at much greater depths (up to seven hundred kilometers).

These are earthquakes that occur at a depth at which the subducted lithosphere should no longer be brittle, due to the high temperature and pressure.

A possible mechanism for the generation of deep focus earthquakes is faulting caused by olivine undergoing a phase transition into a spinel structure.

Earthquakes may also occur in volcanic regions and are caused there both by tectonic faults and by the movement of magma in volcanoes.

Such earthquakes can be an early warning of volcanic eruptions.

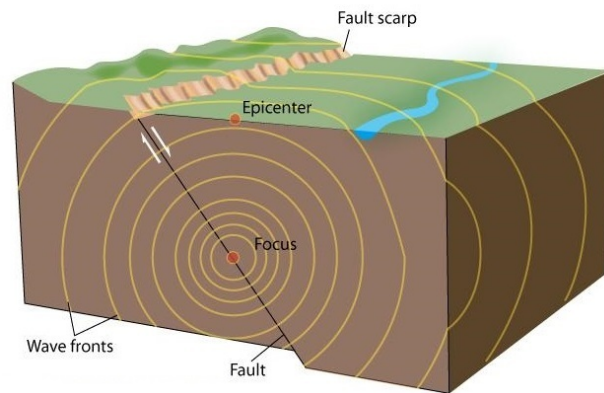
A recently proposed theory suggests that some earthquakes may occur in a sort of earthquake storm, where one earthquake will trigger a series of earthquakes each triggered by the previous shifts on the fault lines, similar to aftershocks, but occurring years later, and with some of the later earthquakes as damaging as the early ones.

Such a pattern was observed in the sequence of about a dozen earthquakes that struck the North Anatolian Fault in Turkey in the 20th century, the half dozen large earthquakes in New Madrid in 1811-1812, and has been inferred for older anomalous clusters of large earthquakes in the Middle East and in the Mojave Desert.

What are some facts about earthquakes for kids?

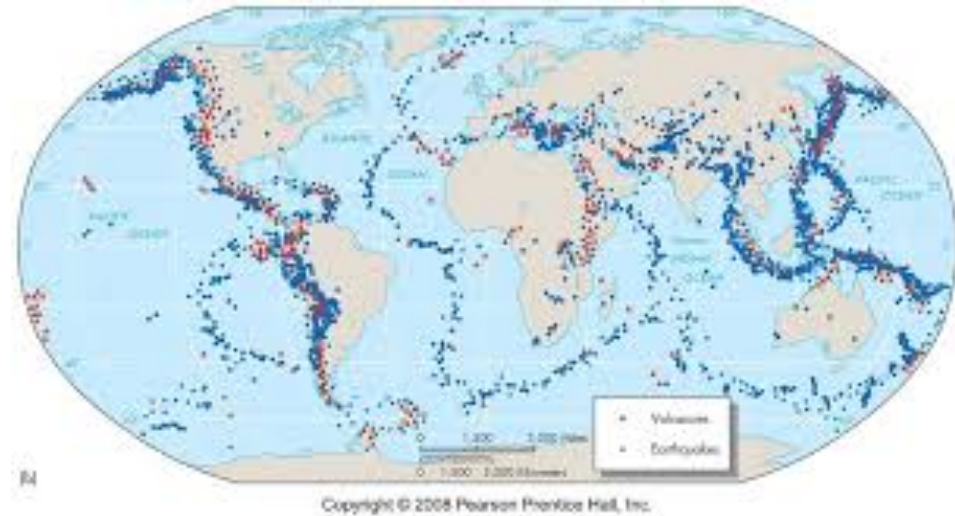
- The biggest earthquake to ever occur happened in Chile in 1960. It lasted for ten whole minutes!
- Japan has the highest rate of earthquakes in the world, as it's situated along the edge of two tectonic plates.
- Each year, there are over a million earthquakes. Most of them are quite inconsequential.
- Tsunamis are usually caused by earthquakes.

Seismic waves radiate from the focus of an earthquake



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Activity



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