GRADE 10	TERM 2	SOCIAL SCIENCES (GEOGRAPHY) GEOMORPHOLOGY UNIT 5: VOLCANOES

LEARNING OUTCOMES:

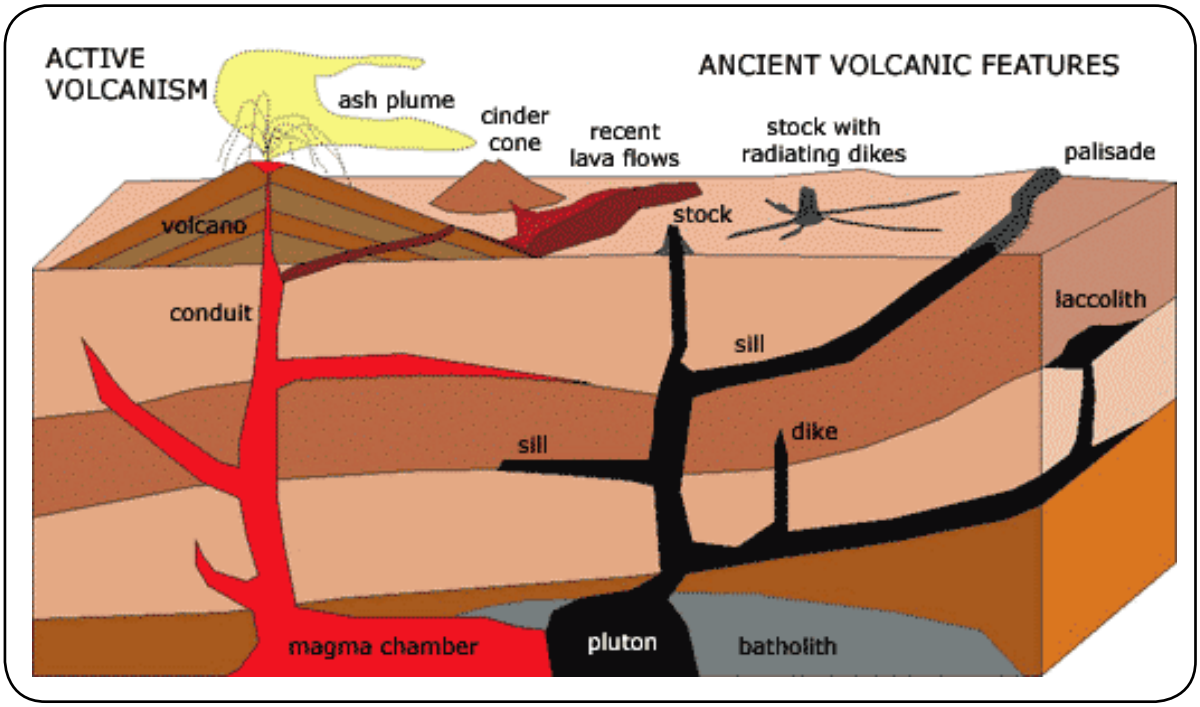
- Types of volcanoes
- Structure of volcanoes
- Impact of volcanoes on people and the environment

TYPES OF VOLCANIC ACTIVITY

There are two main types of volcanic activity; namely ***intrusive*** (inside the Earth's crust) and ***extrusive*** (on the Earth's crust).

Refer to the diagram below and complete the table beneath it.

Intrusive Igneous Features



Batholith	
Pluton	A body of intrusive igneous rock (batholiths, dikes, sills, etc)
Magma Chamber	A reservoir of magma within the Earth's crust beneath a volcano
Dike	
Sill	
Laccolith	
Lopolith	
Granite Dome	Exposed batholith on Earth's surface. (refer to your massive igneous rock notes. *Grd 11)

TYPES OF VOLCANOES

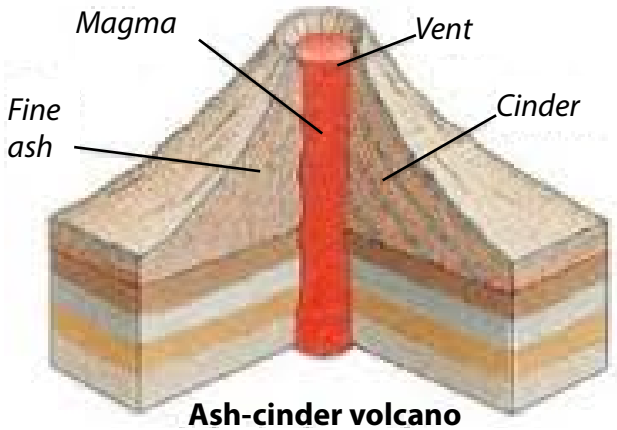
There are three main types of volcanoes and these are classified according to their activity. A volcano that regularly erupts, or has erupted in the last 30 years or so is known as an active volcano while a volcano that has not been active for a few hundred years but may still yet erupt is called a dormant volcano. A volcano that has not erupted in all of recorded history, and shows no signs of doing so in the imminent future, is known as an extinct volcano.

In this section we are going to focus on active volcanoes.

Volcanoes are classified according to their _____ and the way in which they _____ .

Cinder Cone Volcanoes

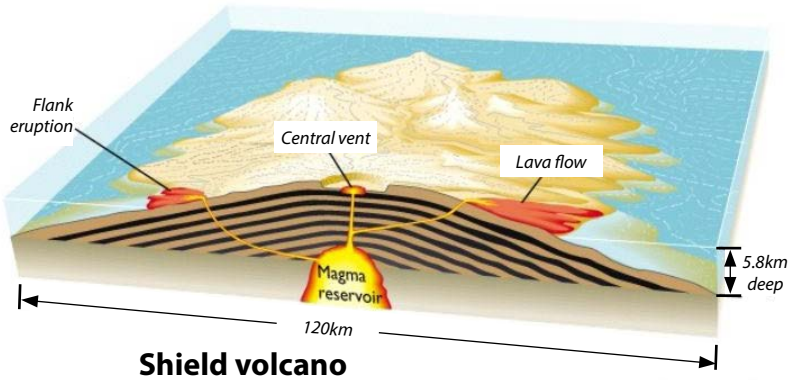
These are steep-sided volcanoes formed by the deposition of solid material. The lava is almost solid (consists of ash, lava bombs, rock chunks, partially solidified lava and so on). The eruptions from these are often extremely explosive and in some cases, so powerful that the entire volcano just explodes; leaving nothing behind but a hollow depression in the land which is called a **caldera**.



Ash-cinder volcano

Shield Volcanoes

These are formed by basalt lava, which is extremely hot (above 1200°C) and very fluid. As a result of the lava being so fluid, the lava flows for a long distance before cooling, so the sides of the volcano are gentle (therefore, it looks like a shield) and the eruptions are not very explosive. There is a lot of time to evacuate an area. The Hawaiian Islands are an example of this type of volcano.



Shield volcano

Composite Volcanoes

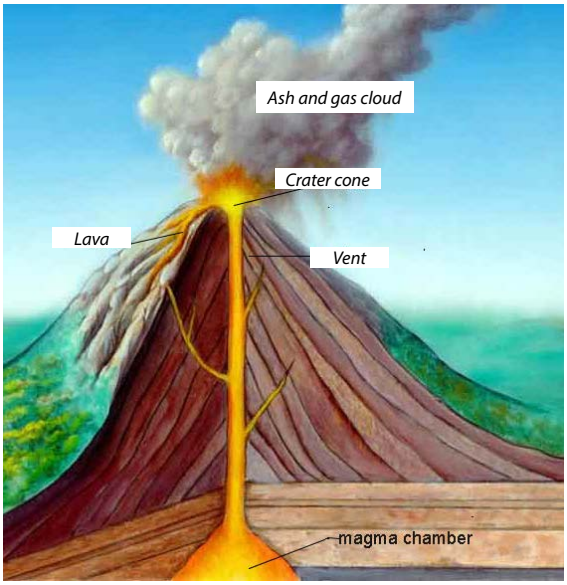
These are the most common kind of volcano and are made up of alternating layers of ash and lava. The lava is not that hot (ranging from 800°C to 1200 °C. As a result, the lava is "clumpy" and thick. The lava does not flow smoothly and the sides of the volcano are steep as a result.

THE FORMATION OF A CALDERA

In the spaces below; outline the formation of a caldera.

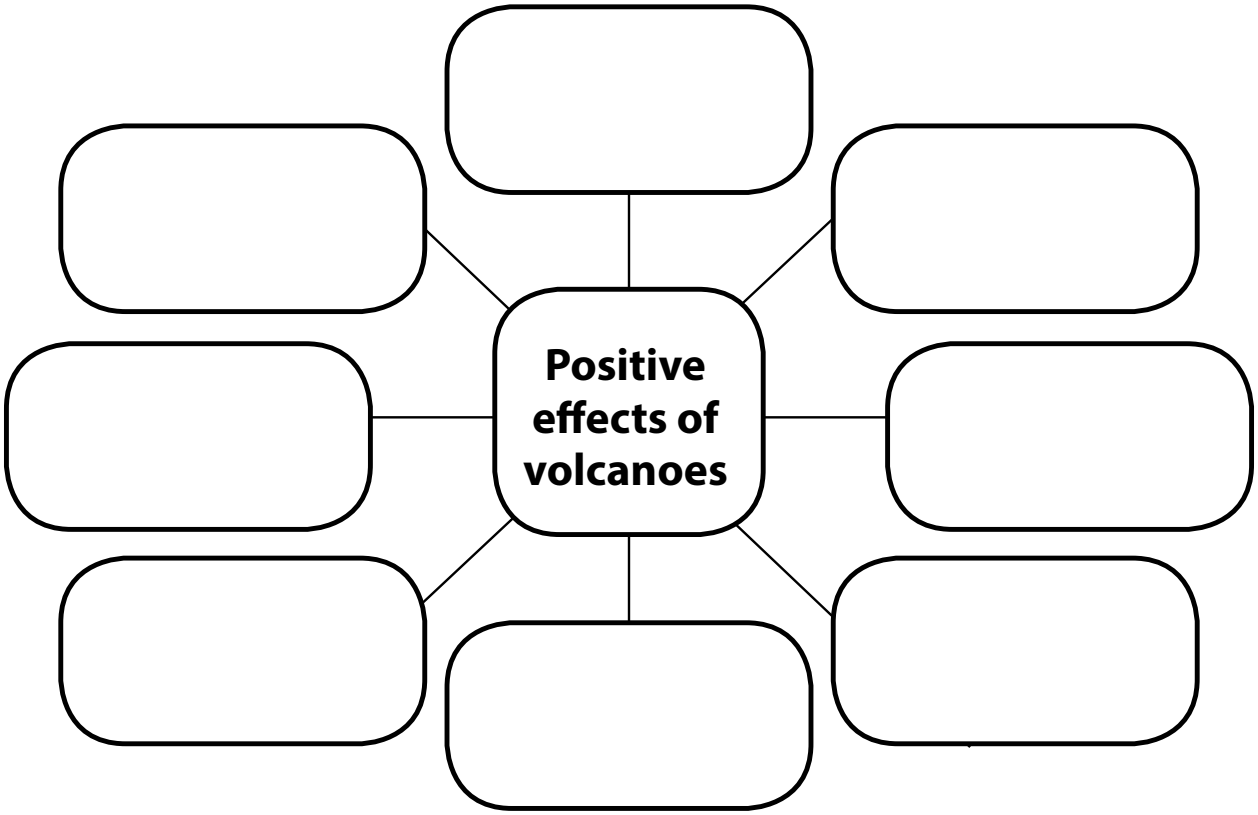
1.
2.
3.

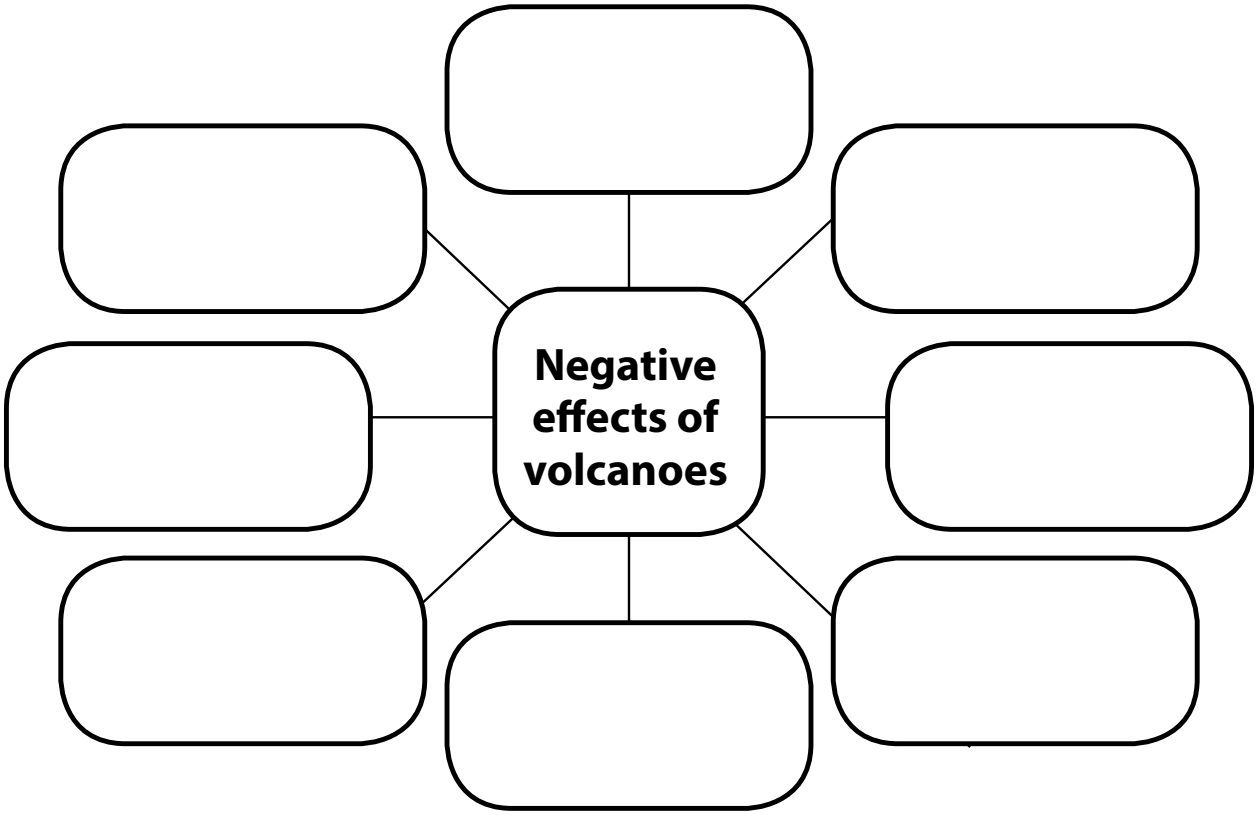
TIME FOR SOME RESEARCH…



What is pyroclastic cloud?

Complete the following mind-map.





ACITVITY 6

Read the following case study and answer the questions that follow:

Revealing the risks of a recently active volcano in Southern Chile

A study by a Victoria University Earth scientist has revealed the frightening potential risk posed by a recently active volcano in southern Chile, and provides insight into what could happen in New Zealand.

Associate Professor Brent Alloway, from Victoria University of Wellington's School of Geography, Environment and Earth Sciences (SGEES) is senior co-author in collaborative research (Chile-New Zealand-Argentina-United Kingdom) which was the cover story in January's issue of the leading journal Geology.

The article reveals the past history of the Chaitén volcano in southern Chile, which erupted in 2008, resulting in the partial destruction of nearby Chaitén township and serious disruption to population centres, infrastructure and economy downwind in Argentina.

"The 2008 Chaitén eruption made international headlines at the time since, in the eyes of the media, it was an out-of-the-blue event occurring without warning," says Dr Alloway.

"From a scientific point of view it was a unique and exciting opportunity to view an explosive rhyolitic (high silica) eruption—the first of its type to be experienced world-wide since the Novarupta (Alaska) eruption of 1912.

"The eruption provided an unprecedented scientific opportunity to examine all facets of such an eruption ranging from magma ascendency rates to ash-fall effects on infrastructure and organisms. This eruption was also recognised as being similar in magnitude, as well as physical and chemical characteristics, to what could be reasonably be expected in future eruptions from volcanic centres situated in the Taupo Volcanic Zone here in New Zealand."

(reference:http://goo.gl/vHGtAC; Accessed: 11 Mar 2015)

Sediments from a small lake located close to Chaitén Volcano revealed 26 volcanic ash layers that were deposited over the last 10,000 years, 10 of which came from Chaitén Volcano. So, in addition to the 2008 eruption, there had been three previously unknown eruptions between 600 and 850 A.D. as well as another at around 420 A.D. That means eruptions have been occurring at Chaitén about every 200 years over the last 1000 years.

"It's pretty clear that our results will need to be carefully considered by both the Chilean authorities and the local community as they continue with restoration and rebuilding in the aftermath of the 2008 eruption. There's always a likelihood that there will be another eruption at Chaitén, the timing of which, along with its magnitude, cannot be predicted with any certainty.

"Real-time seismic monitoring of Chaitén Volcano should assist in providing timely advance warning of an impending eruption and help to prevent any loss of life in the future."

Chaitén volcano is visited and studied by third and fourth year Earth science students at Victoria University as part of a field-trip based course held in southern Chile and Argentina, run by Dr Alloway every two years.

1. What type of volcano is being described in the article? Quote from the article to justify your choice.

2. According to the article, why is it important to study volcanic activity?

3. What do you understand by the following quote from the article?
   The eruption provided an unprecedented scientific opportunity to examine all facets of such an eruption ranging from magma ascendency rates to ash-fall effects on infrastructure and organisms.

4. Examine four possible negative economic effects of volcanic eruptions?

5. Discuss four positive aspects of volcanoes.