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## Level 1 Geography, 2017

### 91007 Demonstrate geographic understanding of environments that have been shaped by extreme natural event(s)

9.30 a.m. Thursday 23 November 2017

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate geographic understanding of environments that have been shaped by extreme natural event(s).	Demonstrate in-depth geographic understanding of environments that have been shaped by extreme natural event(s).	Demonstrate comprehensive geographic understanding of environments that have been shaped by extreme natural event(s).

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–14 in the correct order and that none of these pages is blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

Excellence

TOTAL

23

ASSESSOR'S USE ONLY

**INSTRUCTIONS**

In the box below, name **ONE** type of **extreme natural event**, and an **environment case study (studies)** in which it has occurred, that you will use to answer **ALL** of the questions in this booklet.

Extreme natural event: Tsunami //

Environment case study (studies): 2004 Indian Ocean Tsunami //

**QUESTION ONE: NATURAL PROCESSES**

Read the geographic concept below and refer to it when answering this question.

**Geographic Concept**

**Processes** are a sequence of actions, natural and / or cultural, that shape and change environments, places, and societies. Processes vary in time and space, and in magnitude (size) and frequency.

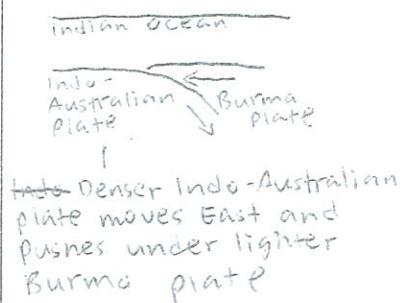
Processes are studied by geographers to help explain features of our world. These processes may cause extreme natural events that occur **above** the earth's surface, **on** the earth's surface, or **below** the earth's surface.

Fully explain the **natural** processes that operated to produce the extreme natural event in your environment case study (studies).

In your answer, include geographic terminology, the geographic concept of processes, with integrated detailed supporting evidence from your environment case study (studies), and a relevant supporting diagram and/or map.

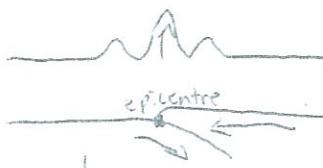
**PLANNING (OPTIONAL)**

## 1. Subduction



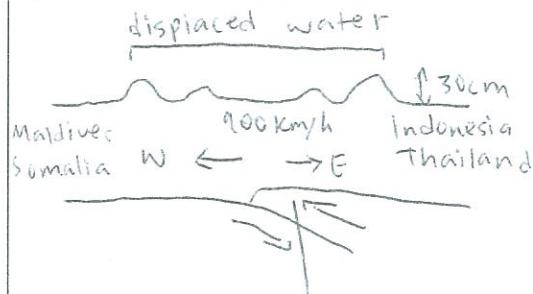
## Diagram and/or map

## 2. Formation of an earthquake



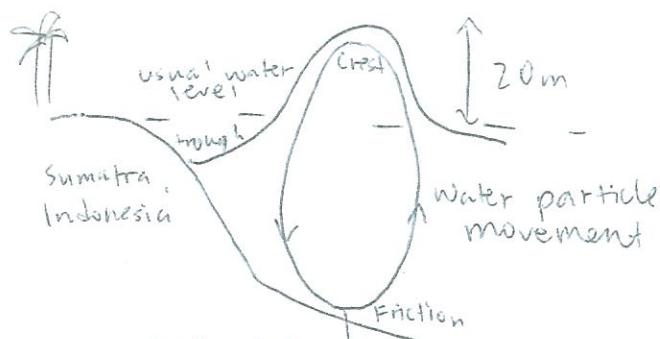
On December 26 2004 the Indo-Australian plate slipped 90cm beneath the Burma plate causing a 9.3 magnitude earthquake.

## 3. Formation of a tsunami



Earthquake caused Burma plate to spring a metre upward, displacing the water causing a series of long waves that travelled at 900 km/h

## 4. Wave formation



Friction between water and seafloor causes the wave to slow down, increasing its height

The 2004 Indian Ocean Tsunami was caused by 4 processes: subduction, formation of an earthquake, formation of a tsunami, and wave formation. Processes are a sequence of natural/cultural events that can change environments, places and societies. These processes affected over 14 countries including Indonesia, Thailand and Sri Lanka and killed over 230 000 people.

The first process was subduction. There is a plate boundary below the Indian Ocean where the Indo-Australian plate and the Burma plate meet. The Indo-Australian plate is denser and pushes under the lighter Burma plate at an average rate of 6cm per year. There has been no movement for the past 150 years causing

a build-up of pressure. This process can then break the Earth's crust and cause an earthquake. //

The next process that occurred was formation of an earthquake. The built up of pressure due to the subduction process caused the Earth's crust to break in which the released energy moved through the Earth as shock waves. On December 26th 2004, the Indo-Australian plate slipped 90cm beneath the Burma plate causing a 9.3 magnitude earthquake where people experienced shaking for eight minutes. The epicentre was located 30km below the Indian Ocean's surface. This process can then displace water and cause a tsunami. //

The next process that occurred was formation of a tsunami. The Earthquake process caused the Burma plate to spring a metre upward, displacing water causing waves to spread out in all directions. Waves travelled at 900 km/h but smaller 30cm waves were not as noticeable. This tsunami process then led to formation of bigger waves. //

The next process was wave formation. Water particles travel in an orbit and transfer energy as they bump into each other. As the wave approaches shallow water, friction is created between the wave and the seafloor causing the wave to slow down and shorten. The top of the wave moves faster than the bottom, increasing its height and energy with which it breaks onto the land. 30cm waves became 20m and waves reached land at different times. Waves headed east took 30 mins to reach Sumatra, Indonesia and waves travelling West headed to Sri Lanka, India, Maldives. //

E8

Extra space if required.  
Write the question number(s) if applicable.

1. After Indonesia, Waves continued across Andaman Sea to Thailand. The trough reached land first causing the sea to recede before jumping thousand tonnes of water. //

To conclude, the 2004 Indian Ocean Tsunami was caused by 4 processes ~~and~~ subduction, formation of an earthquake, formation of tsunami and wave formation //

3. people's lives and impacted the cultural environmental. Jobs were lost, ~~the~~ homes were destroyed and the economy was impacted due to the cost of rebuilding infrastructure //

**QUESTION TWO: ENVIRONMENTS**

Read the geographic concept below and refer to it when answering this question.

**Geographic Concept**

Environments may be natural and / or cultural. They have particular characteristics and features which can be the result of natural and / or cultural processes. The particular characteristics of an environment may be similar to or different from another. A cultural environment includes people and the built environment.

Fully explain how ONE cultural characteristic (feature) OR ONE natural characteristic (feature) has made your environment case study (studies) **more vulnerable** to your extreme natural event.

Cultural or natural characteristic: Location of affected regions //

In your answer, include geographic terminology, the geographic concept of environments, with integrated detailed supporting evidence from your environment case study (studies).

**PLANNING (OPTIONAL)**

The 2004 Indian Ocean Tsunami caused over 230 000 deaths in over 14 countries including India, Indonesia, Thailand and Sri Lanka. Some countries were more vulnerable due to the characteristics of their environments. A natural characteristic that made countries like Indonesia, Thailand, India and Sri Lanka more vulnerable was the location as they were located close to the epicentre of the earthquake, they had low lying land, and no vegetation in the environment to act as a buffer for the tsunami waves //

The earthquake was due to the Indo-Australian plate slipping 90cm beneath the Burma plate which occurred below the Indian Ocean. The location of this process occurred along a major fault line which had countries in S.E Asia ~~near~~ in the environment. The epicentre of the earthquake was located 250km off the West Coast of Sumatra, Indonesia and so it made the environment more vulnerable due to its close location. //

Countries like Indonesia and Thailand have low lying land in its locations near the beach and so it resulted in an easy travel path for the tsunamis, therefore making the environment more vulnerable due to no buffers. Countries like Maldives and Indonesia that were affected ~~south of how big~~ have low relief where they are located as Maldives is only 3.7m above sea level and Banda Aceh only 8m above sea level. Heights of waves reached up to 20m and //

so the location of these affected countries made the environment more vulnerable as the land was low and provided no natural buffers //

Some areas also had no vegetation in their location to protect the environment. Mangroves can absorb up to 70-90% of the energy from a wave. In a village in Sri Lanka where there were dense mangroves, there were 2 deaths compared to another village in Sri Lanka where ~~there wasn't~~ <sup>Lack of</sup> vegetation, 6000 people died. The mangroves therefore made certain environments more vulnerable as there weren't any buffers to reduce the impact of the waves //

to conclude, the location of the areas that were affected like Indonesia, Thailand, Sri Lanka had no vegetation ~~in~~ in its location, they were close to the epicentre of the earthquake, and consisted of low lying land. The location where the tsunami occurred made those environments more vulnerable to the 2004 Indian Ocean Tsunami //

EF

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The examination continues on the following page.

### QUESTION THREE: CHANGE

Read the geographic concept below and refer to it, as well as the diagram, when answering this question.

#### Geographic Concept

Change involves any alteration to the natural or cultural environment. Change can be spatial and/or temporal. Change is a normal process in both natural and cultural environments. It occurs at varying rates, at different times, and in different places. Some changes are predictable, recurrent or cyclic, while others are unpredictable or erratic. Change can bring about further change.

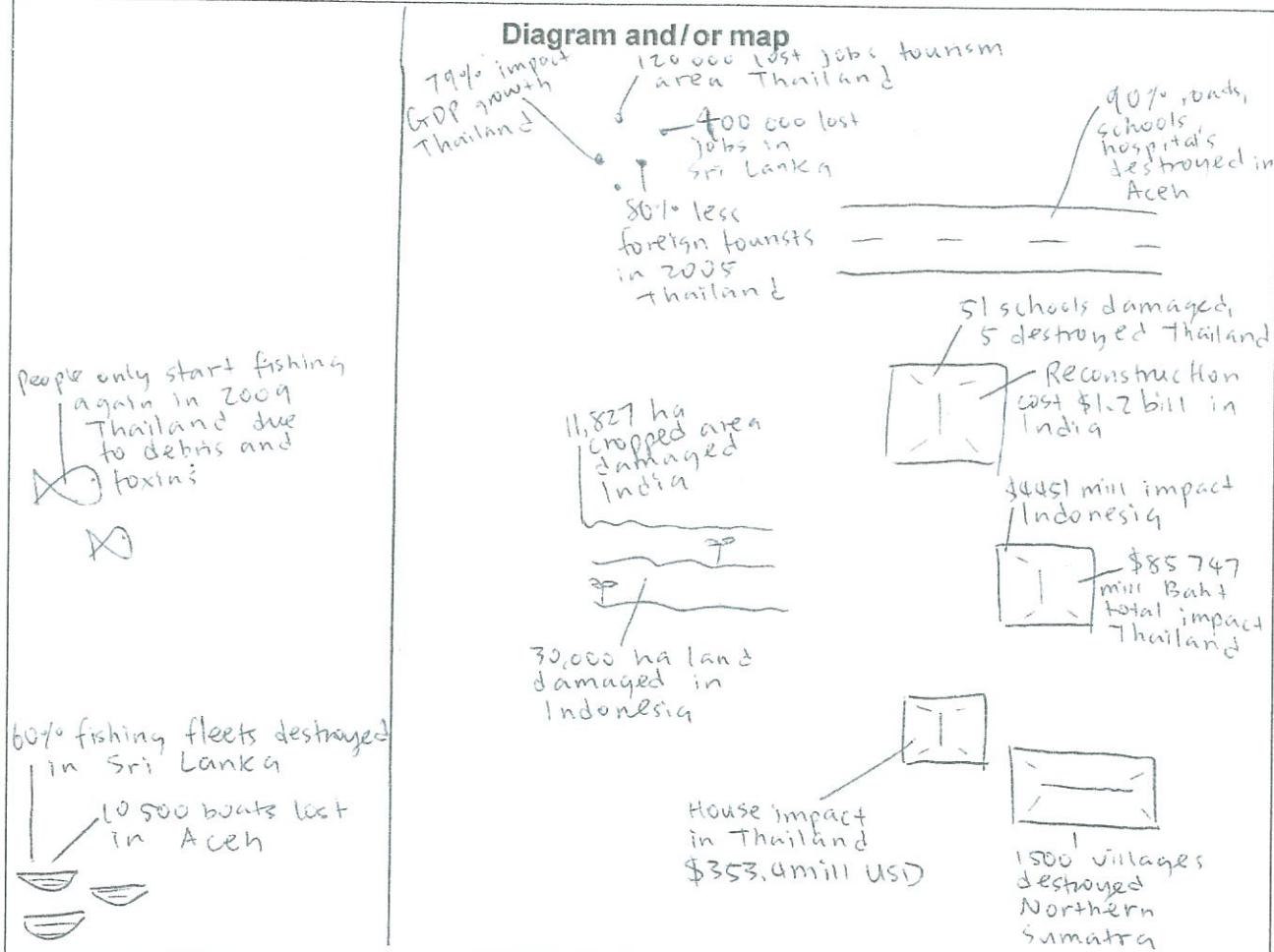
A cultural environment can be made of the following characteristics:



Fully explain the effects of your extreme natural event on the **cultural environment** of your case study (studies).

In your answer, include geographic terminology, the geographic concept of change, with integrated detailed supporting evidence from your environment case study (studies), and a relevant supporting diagram and/or map.

#### PLANNING (OPTIONAL)



The 2004 Indian Ocean Tsunami caused over 230 000<sup>Deaths</sup>, affected over 14 countries and changed the lives of many people, as well as the cultural environment.

The infrastructure of countries like Thailand and Indonesia was heavily impacted and changed. Over 51 schools were damaged in Thailand ~~and~~ at least 5 were fully destroyed. This has a negative ~~long~~ long term impact as it means children cannot go to school until they are rebuilt which can take months, so they will not be able to continue their education. The total cost for rebuilding homes in Thailand is \$353.4 mill USD ~~which~~ and 80% less foreign tourists

visited Thailand in 2005 which makes the impact even bigger as tourism is their main source of income. People could only start fishing and going to the sea as late as 2009 as debris and body remains were stuck in the coral and caused health issues. This had a negative long term impact as many relied on the sea for food and income. Over 60% of fishing fleets were destroyed in Sri Lanka and 10,500 boats were lost in Aceh. 1500 villages were destroyed in Northern Sumatra and over 90% of roads, schools and hospitals which completely changed the cultural environment as there was a lot of debris to clean up and buildings to rebuild. The total economic impact in Indonesia was \$4451 million and the reconstruction cost for India was estimated at \$1.2 billion. These impacts ~~greatly~~ changed the economic activities and had a negative long term impact on the country's economy. 11,827 ha of cropped area was damaged in India and 30,000 ha of land was affected in Indonesia which has negative long term impact on people's lives as they may rely on agriculture as their source of income or food and so the change in environment would've changed their ~~livelihoods~~ livelihoods. 120,000 people lost jobs in the tourism area in Thailand and 400,000 lost jobs in affected regions in Sri Lanka. This has a negative impact on people's lives as they can no longer earn money to provide for their family, putting them in a poverty cycle and this can also change the country's GDP as there ~~are~~ less people to contribute. To conclude, the 2004 Indian Ocean Tsunami changed //

E8

Extra space if required.  
Write the question number(s) if applicable.

1. After Indonesia, Waves continued across Andaman Sea to Thailand. The trough reached land first causing the sea to recede before jumping thousand tonnes of water. //

To conclude, the 2004 Indian Ocean Tsunami was caused by 4 processes ~~and~~ subduction, formation of an earthquake, formation of tsunami and wave formation //

3. people's lives and impacted the cultural environmental. Jobs were lost, ~~the~~ homes were destroyed and the economy was impacted due to the cost of rebuilding infrastructure //

**Excellence exemplar 2017**

<b>Subject:</b>		<b>Geography</b>	<b>Standard:</b>	<b>91007</b>	<b>Total score:</b>	<b>23</b>
<b>Q</b>	<b>Grade score</b>	<b>Annotation</b>				
1	E8	The candidate shows a comprehensive understanding of the natural processes that operated to cause the Indian Ocean Tsunami. The diagram is detailed and relevant and shows a clear sequence of events. The candidate has integrated detailed supporting evidence, geographic terminology, and the concept of processes throughout the response. There is insight within the introduction as the candidate has described the concept of processes and linked this to their case study (with supporting evidence).				
2	E7	The candidate has selected a broad characteristic (location) which has allowed them to explain their answer in depth. They have demonstrated an understanding that location made some environments within the Indian Ocean more vulnerable than others. The response has a clear structure and the final paragraph shows some insight. An E8 response could have had a clearer explanation and more detailed evidence on the location of vegetation types. For example, the evidence "a village in Sri Lanka" is a general statement.				
3	E8	The candidate response showed a comprehensive understanding of the cultural environment of the Indian Ocean region and how it had been changed by the 2004 tsunami. The candidate explained numerous cultural effects and was able to include pieces of detailed supporting evidence from different parts of the region to back up the effects they had explained. Insight was shown by linking effects together (change leading to further change), grouping effects clearly into categories (infrastructure, economy, tourism, etc), and by using terms such as "negative long term" impact.				