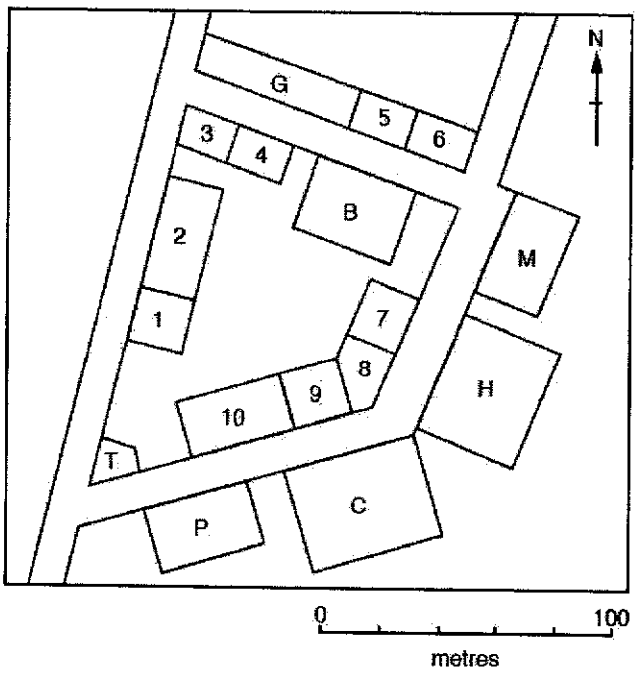
[Adapted from Maris Stella High School 4E Prelim 2021]

Section A

Answer **one** question from this section.

1 A group of students in Sydney, Australia wanted to investigate whether the landuse in Bondi Junction catered to tourists. Photograph A (Insert 1) shows an aerial view of Bondi Junction. The area is a town centre about three kilometres from the world-famous Bondi Beach. On a day during the winter holidays in June, the students did some fieldwork to identify and map the different shops and services in the town centre. Fig. 1 shows part of their map.

Landuse map by students



Key to buildings

T	Tourist information office	1	Bookshop
P	Pub/bar	2	Outdoor clothes shop
C	Church	3	Cycle repair and hire
H	Hotel	4	Café
M	Museum	5	Butcher's shop
B	Bank	6	Florist's shop
G	Art gallery	7	Bakery
		8	Gift shop
		9	Restaurant
		10	Fashion clothes shop

Fig. 1

(a) **(i)** Identify the building 140 metres north east of the tourist information office. [1]

(ii) Outline the steps students should take in analysing the landuse map to make it more useful to their fieldwork. [3]

(b) As part of their research, the students also wanted to find out more about the impacts of tourism on Bondi Junction. Table 1 shows the number of tourists visiting in each month of the year.

Table 1

Number of tourists in Bondi Junction during different months of the year

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of tourists	1308	1116	789	753	892	712	643	859	921	834	1052	1368

(i) Describe how students can use a secondary source to calculate the tourist numbers as shown in Table 1. [2]

(ii) The students came up with a hypothesis which states that the number of tourists could be affected by seasons of the year. Other than a questionnaire survey, use Table 1 to describe how the students could conduct a fieldwork study to test the hypothesis at Bondi Junction. [3]

(c) At the street directly facing the bank (Fig. 1), students asked residents a series of questions using an open-ended questionnaire survey. They interviewed a sample of 100 residents who live and work in and around Bondi Junction. The results of the survey are shown in Fig. 2.

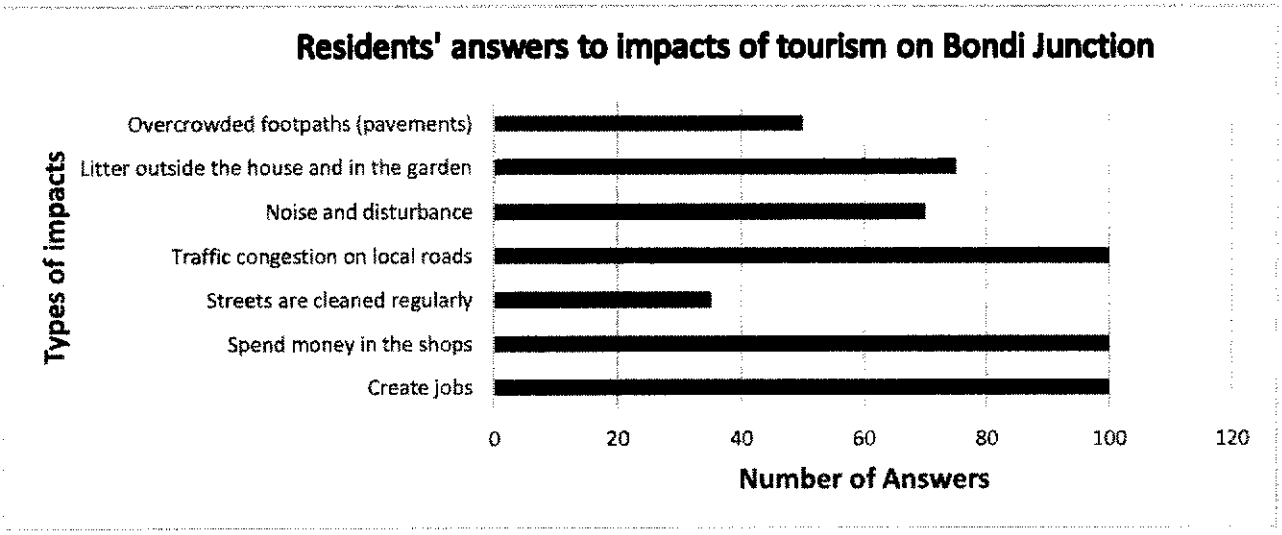
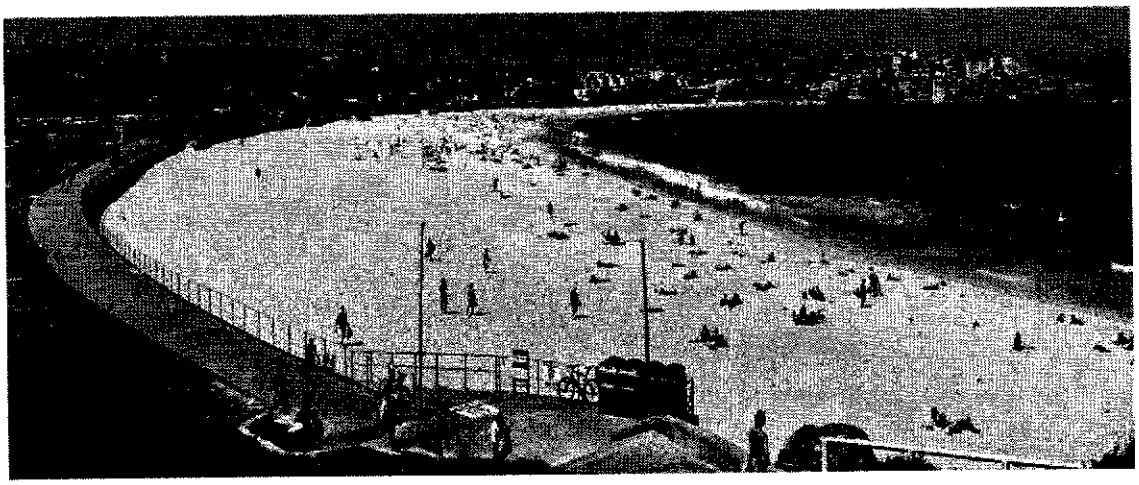


Fig. 2

Based on the answers presented in Fig. 2, the students concluded that tourism may have an uneven impact for the residents in Bondi Junction. Use information from Fig. 2 to argue why this might be a feasible conclusion. [4]

2 **(a)** A group of students in Sydney, Australia were studying how to collect weather data and if there might be a relationship between the atmospheric pressure and rainfall totals in the Bondi Area. They collected data at Bondi Beach (part of the Bondi Area) in Sydney, Australia. Photograph B shows the location where the students conducted the investigation and collected their data.

Location (Bondi Beach) where the students collected data on atmospheric pressure and rainfall totals



Photograph B

(i) Identify a possible instrument that can be used to collect atmospheric pressure. [1]

(ii) To test the hypothesis, the students collected atmospheric pressure at various venues along the beach daily, at the same time in December.

On the sketch provided (Fig. 3), indicate two possible venues (label 1 and 2) where the atmospheric pressure and total rainfall data could be collected and add annotations to justify why you selected these venues. [2]

Fig. 3

(iii) For the study as described above (2a, 2a(i), 2a(ii)), evaluate whether the data collection is reliable. [4]

(b) The students decided to investigate if there is a relationship between atmospheric pressure and daily rainfall. They recorded atmospheric pressure and daily rainfall. The data they collected is shown in Fig. 4.

Atmospheric pressure and daily rainfall totals

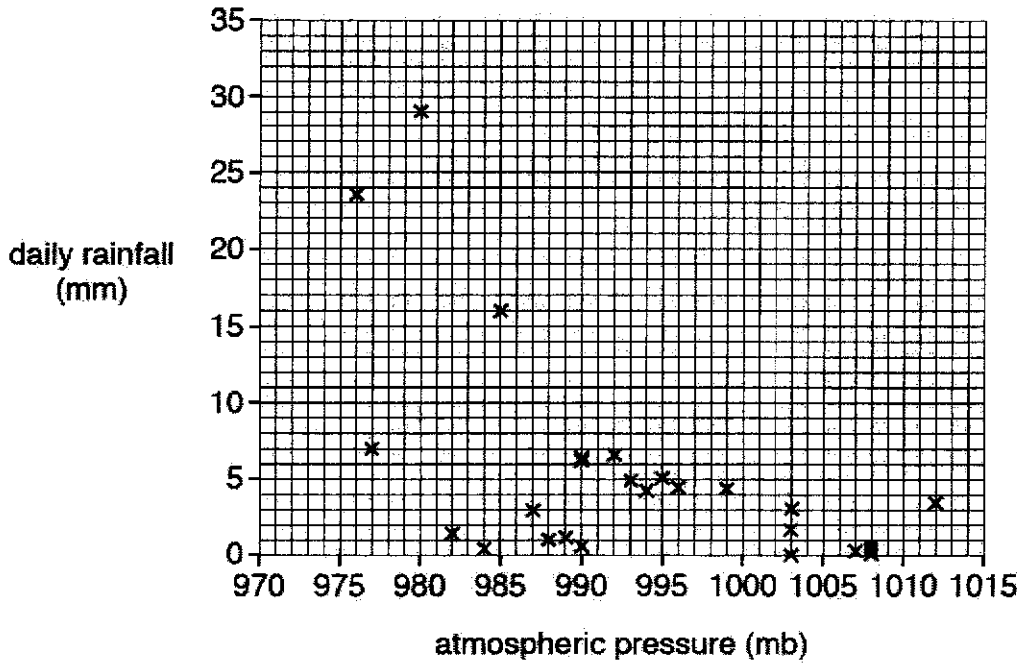
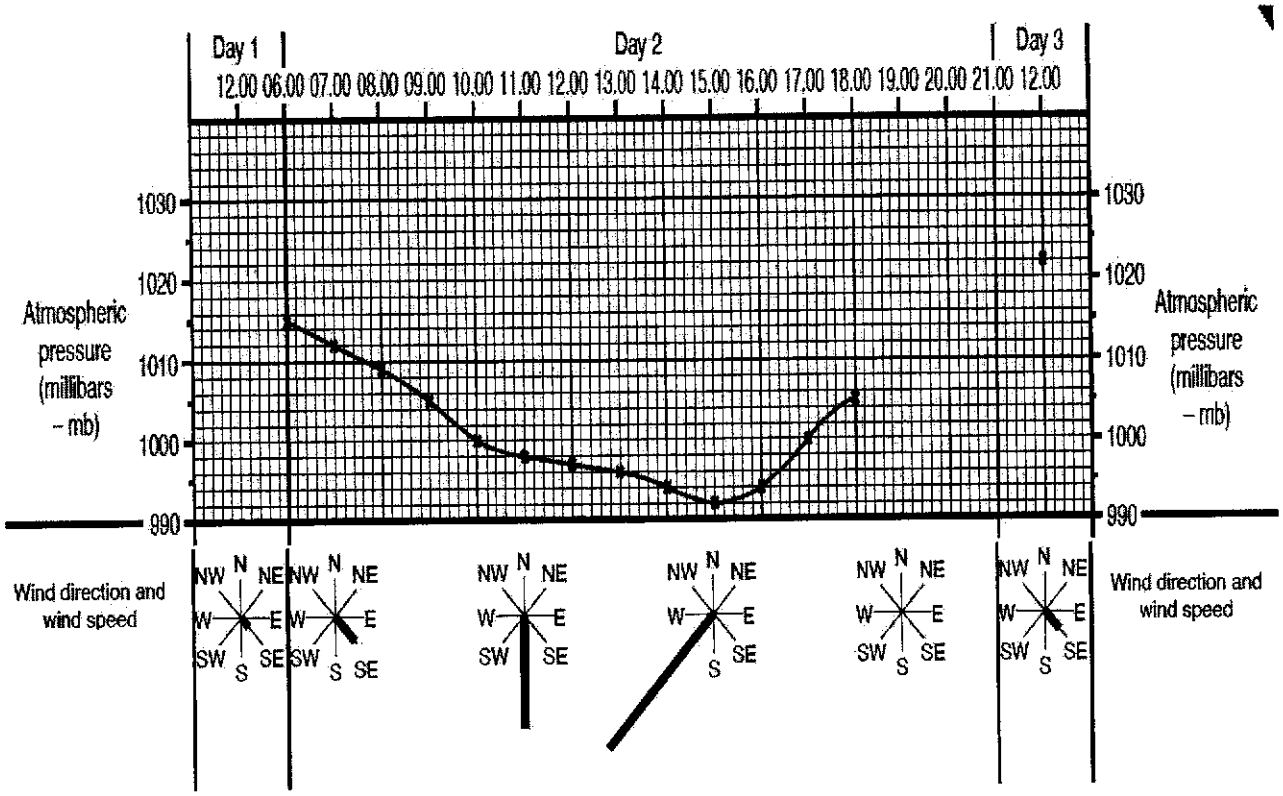


Fig. 4

What conclusion(s) can the students draw from Fig. 4? Support your answer with evidence from Fig. 4. [3]

The students also wanted to investigate whether the atmospheric pressure can be influenced by the wind speed in Bondi Beach. They recorded weather data over three days. Fig. 5 shows the graph where they plotted the data.

Atmospheric Pressure, wind direction and speed over three days



Wind speed 1 mm = 0.2 km per hour

Fig. 5

(c) Based on the data presented in Fig. 5, discuss whether the hypothesis that atmospheric pressure is the highest when wind speed is the strongest is true. Support your answer with evidence. [3]

Section B

Answer **one** question from this section.

3 **(a)** Explain how an international organisation has cooperated with countries to address climate change. [4]

(b) 'Human activities have a greater effect on climate change than natural causes.'

To what extent do you consider this statement to be true? Give reasons to support your answer. [8]

4 **(a)** Explain why deserts have a very large diurnal temperature range. [4]

(b) 'Community-based projects are more effective than laws in developing sustainable tourism.'

To what extent do you consider this statement to be true? Give reasons to support your answer. [8]

Section C

Answer **one** question from this section.

5 (a) Fig. 6 shows information about an earthquake in Sumatra (2004) which triggered a tsunami. Fig. 7 shows the impact on coastlines severely hit by the tsunami.

How the tsunami in Sumatra could have formed in 2004

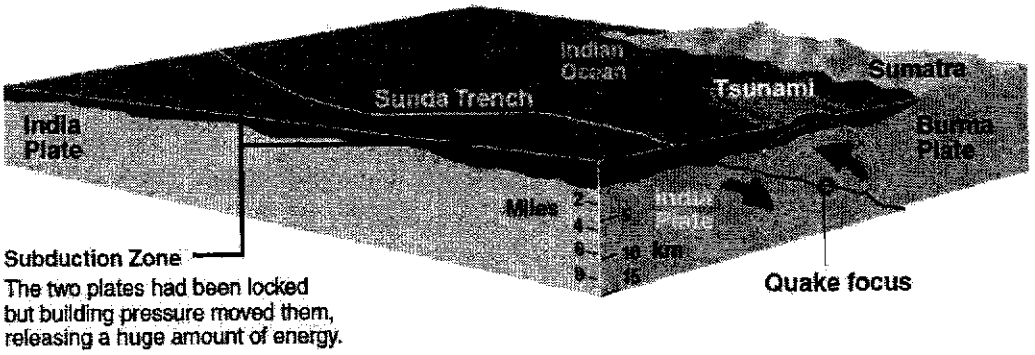
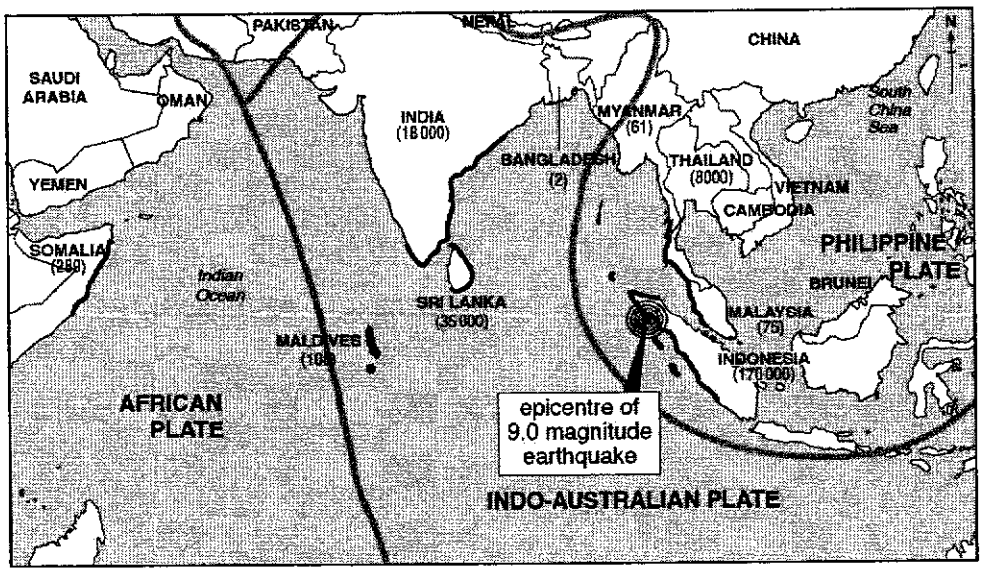


Fig. 6

A map showing the impact the tsunami had on coastlines



Key

- coastline severely hit by tsunamis
- plate boundary
- (61) number of deaths

Fig. 7

(i) Use Fig. 6 to help you explain how the tsunami in Sumatra could have formed. [4]

(ii) Use Fig. 7 and other information you have learnt to explain how and why the number of deaths varied in different countries and cities. [5]

(b) Fig. 8 (Insert 1) shows the food insecurity situation in the world and within regions of the world in 2019. Fig. 9 is an account of the food insecurity in Africa.

An account of the food security in Africa

> In South Sudan, where people fled their homes because of violence, few farmers have been able to harvest a crop. This limits what is available at community markets and raises food prices. Also, in recent years, due to the erratic rainy season caused by global warming, this has resulted in failed harvests. 60% of the country is inaccessible by roads, which limits food aid as well as goods sent to market.

Fig. 9

(i) Use Fig. 8 (Insert 1) to compare the food insecurity situation in the world and within selected regions of the world. [3]

(ii) Use the information from Fig. 9 to help you explain why food insecurity is of concern to many regions of the world. [5]

(c) 'For countries, it is better to focus on the effects of inadequate food consumption than effects of excessive food consumption.'

How far do you agree? Support your answer using evidence. [8]

6 **(a)** Fig. 10 is a world map showing natural hazards of the world.

Selected natural hazards around the world

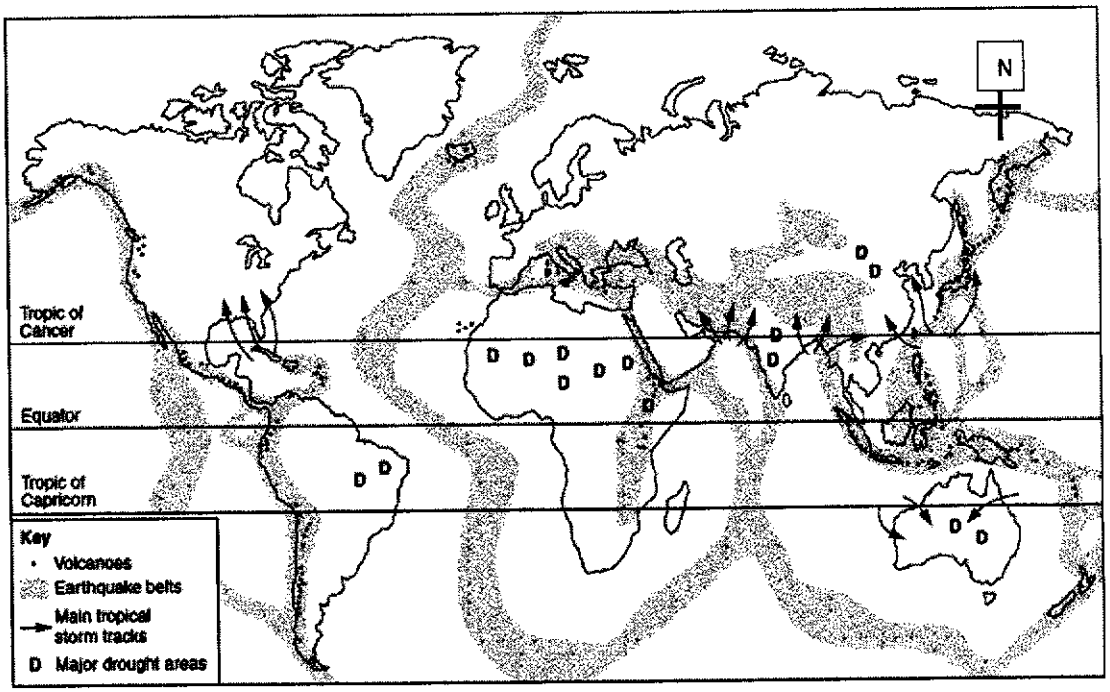


Fig. 10

Using Fig. 10, suggest how these natural hazards can be classified and compare their distribution. [4]

(b) Photograph C shows a famous landmark in Yosemite National Park, USA.

A famous landform in Yosemite National Park, USA

Photograph C

(i) Describe the important geographical features as seen in Photograph C. [5]

(ii) Using Photograph C and other information you have learnt, outline how the landforms could have formed. [4]

(c) Fig. 11 shows an earthquake-proof house designed by engineers.

Design of an earthquake-proof house

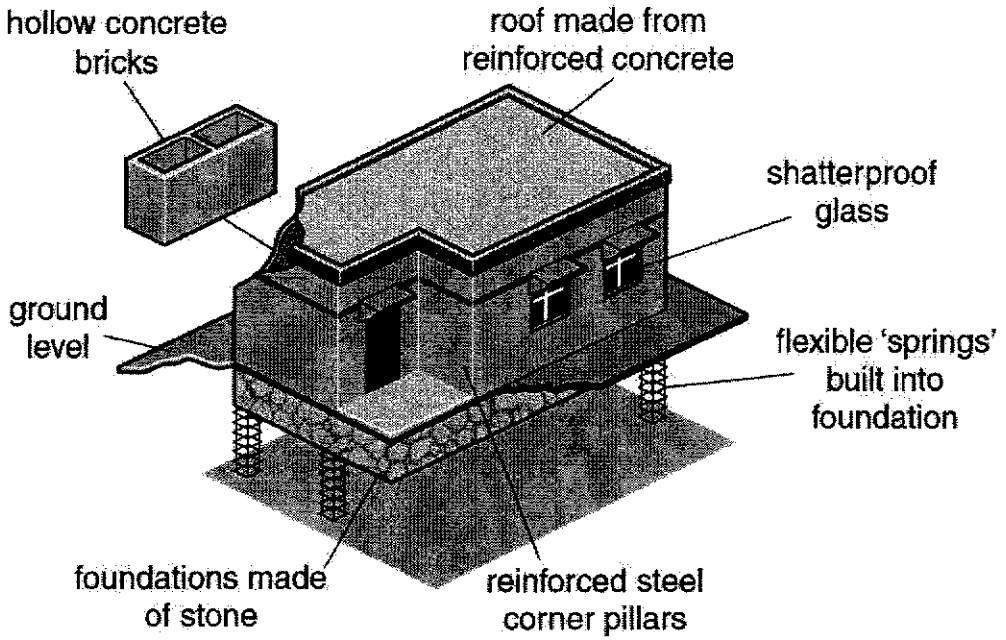


Fig. 11

Use Fig. 11 to help you explain how four of the features labelled would help to protect people if an earthquake occurred. [4]

(d) 'Long term responses reduce the need for short term responses in earthquake management.'

How far do you agree? Use evidence to support your answer. [8]

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Acknowledgements

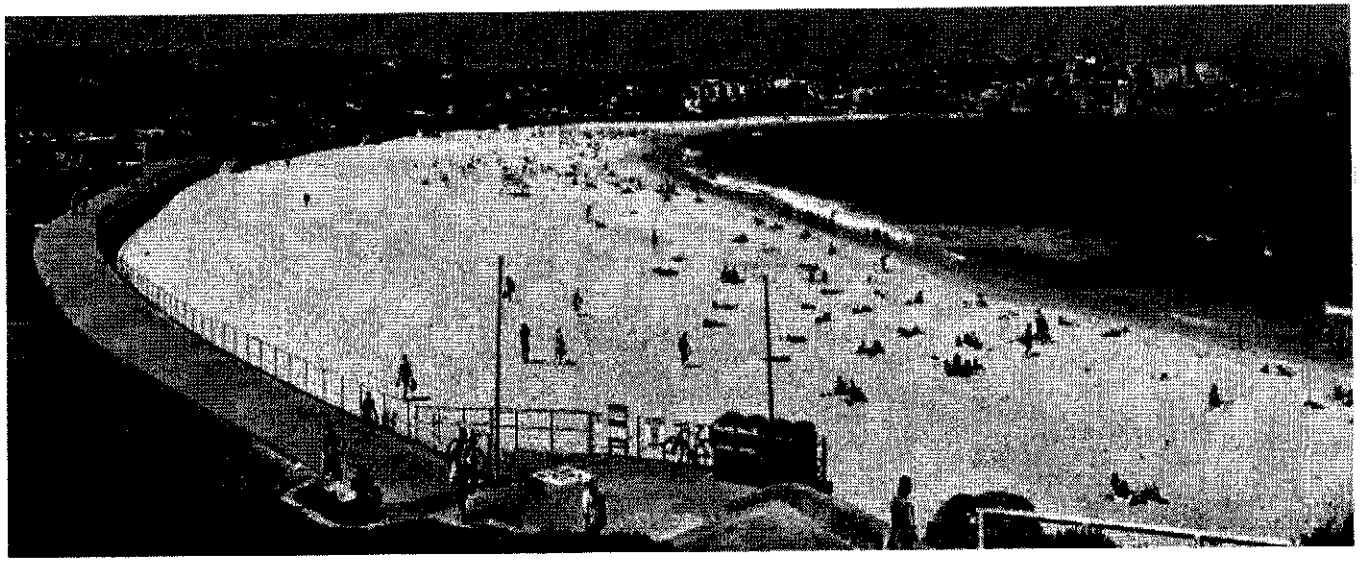
Question 1	Photograph A	https://www.smh.com.au/national/nsw/no-regard-for-design-and-beauty-why-bondi-junction-is-an-eyesore-20180727-p4zu3i.html
Question 1ai	Figure 1	CIE
Question 1bi	Table 1	Author's own
Question 1c	Figure 2	CIE
Question 2	Photograph B	https://www.expedia.com/Bondi-Beach-Sydney.d6060961.Vacation-Attraction?gallery=open&pwaLob=wizard-package-pwa
Question 2aii	Figure 3	Author's own
Question 2b	Figure 4	CIE
Question 2c	Figure 5	CIE
Question 5a	Figure 6	https://creation.com/tsunami-tragedy
Question 5a	Figure 7	CIE
Question 5b	Figure 8	http://www.fao.org/3/ca9692en/online/ca9692en.html#chapter-1_1
Question 5b	Figure 9	https://www.worldvision.org/refugees-news-stories/south-sudan-conflict-facts
Question 6	Figure 10	©Yishun Town Secondary School
Question 6b	Photograph C	https://en.wikipedia.org/wiki/Yosemite_Valley
Question 6c	Figure 11	CIE

Maris Stella High School
4E Prelim 2021
- Suggested Answers

2(a) A group of students in Sydney, Australia were studying how to collect weather data and if there might be a relationship between the **atmospheric pressure and rainfall** totals in the Bondi Area. They collected data at Bondi Beach (part of the Bondi Area) in Sydney, Australia. Photograph B shows the location where the students conducted the investigation and collected their data.

Photograph B

Location (Bondi Beach) where the students collected data on atmospheric pressure and rainfall totals

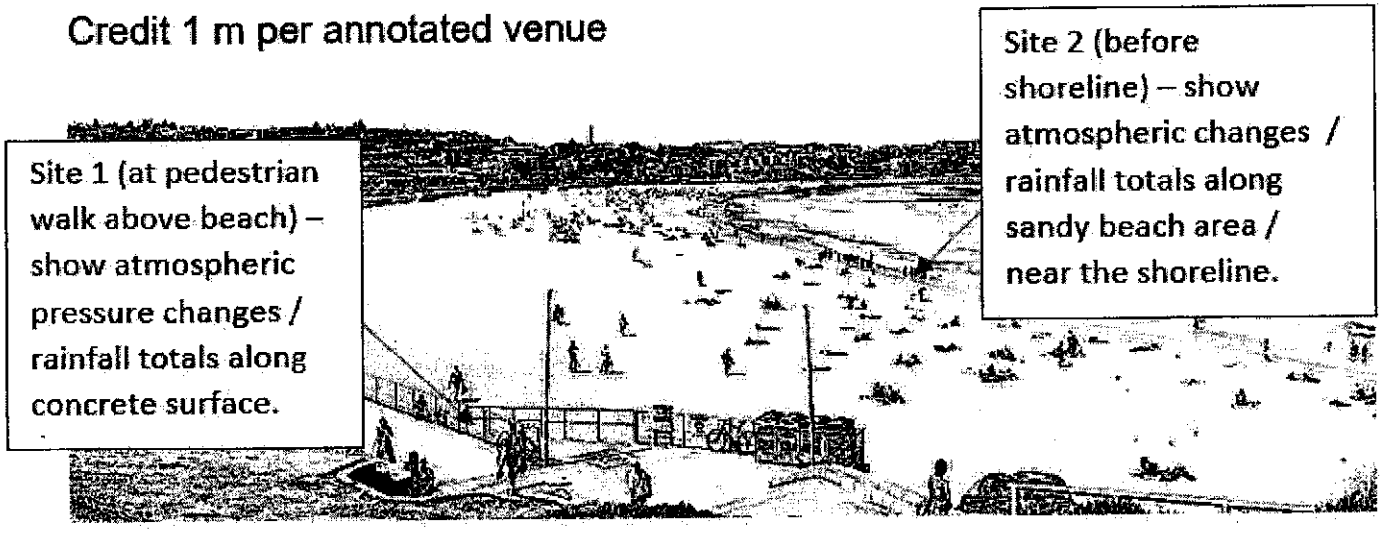


(i) **Identify a possible instrument** that can be used to collect **atmospheric pressure**. [1]

1M	Barometer / weather tracker

(ii) To test the hypothesis, the students collected atmospheric pressure at various venues along the beach daily, at the same time in December.
On the sketch provided (Fig. 3), **indicate two possible venues** (label 1 and 2) where the **atmospheric pressure and total rainfall data** could be collected and **add annotations to justify** why you selected these venues. [2]

Credit 1 m per annotated venue



(Generally the two possible venues should be at different ground surfaces/environmental conditions along beach)

(iii) For the study as described above (2a, 2a(i), 2a(ii)), **evaluate** whether the data collection is **reliable**. [4]

1M	**Stating reliability:** • Partially reliable / unreliable
	Award 1M for each reason; at least 1 reliable and 1 unreliable reason **Reliable** • Having various beach locations will allow for comparison of changes in weather data. • Same time each day means that there is consistency if one is only interested in particular time of day

(iii) For the study as described above (2a, 2a(i), 2a(ii)), evaluate whether the data collection is reliable. [4]

Award 1M for each reason; at least 1 reliable and 1 unreliable reason

<u>Unreliable</u>

- Same time each day means other timings are not considered which may have changes in the weather conditions
- Only 1 month of data (December) collected which will not be able to see changes in other months.
- Only a part of Bondi Area (i.e. the Bondi Beach) is surveyed, does not give representative data of the weather data along the whole beach.

(b) The students decided to investigate if there is a relationship between atmospheric pressure and daily rainfall. They recorded atmospheric pressure and daily rainfall. The data they collected is shown in Fig. 4.

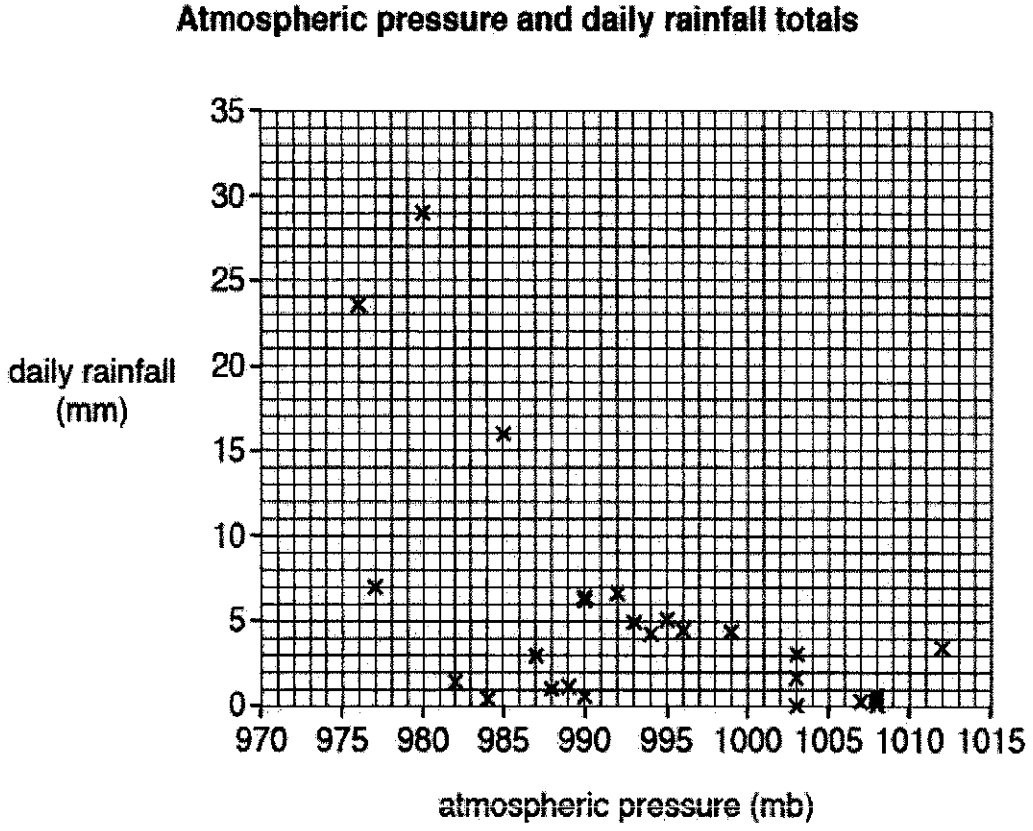


Fig. 4

What **conclusion(s)** can the students draw from Fig. 4? **Support** your answer with **evidence** from Fig. 4. [3]

1M	**Stating conclusion:** • As atmospheric pressure increases, daily rainfall decreases
1M	**Evidence (must show comparison)** • When atmospheric pressure is at 976mb, daily rainfall is 23.5mm whereas when it increases to 1012mb daily rainfall is 3.5 mm.
1M	**However, there are exceptions:** at 990mb, daily rainfall may be 0.5 mm or 6.5 mm OR at 1012mb, daily rainfall is lower than at 990mb (except other valid evidences)

(c) The students also wanted to investigate whether the atmospheric pressure can be influenced by the wind speed in Bondi Beach. They recorded weather data over three days. Fig. 5 shows the graph where they plotted the data.

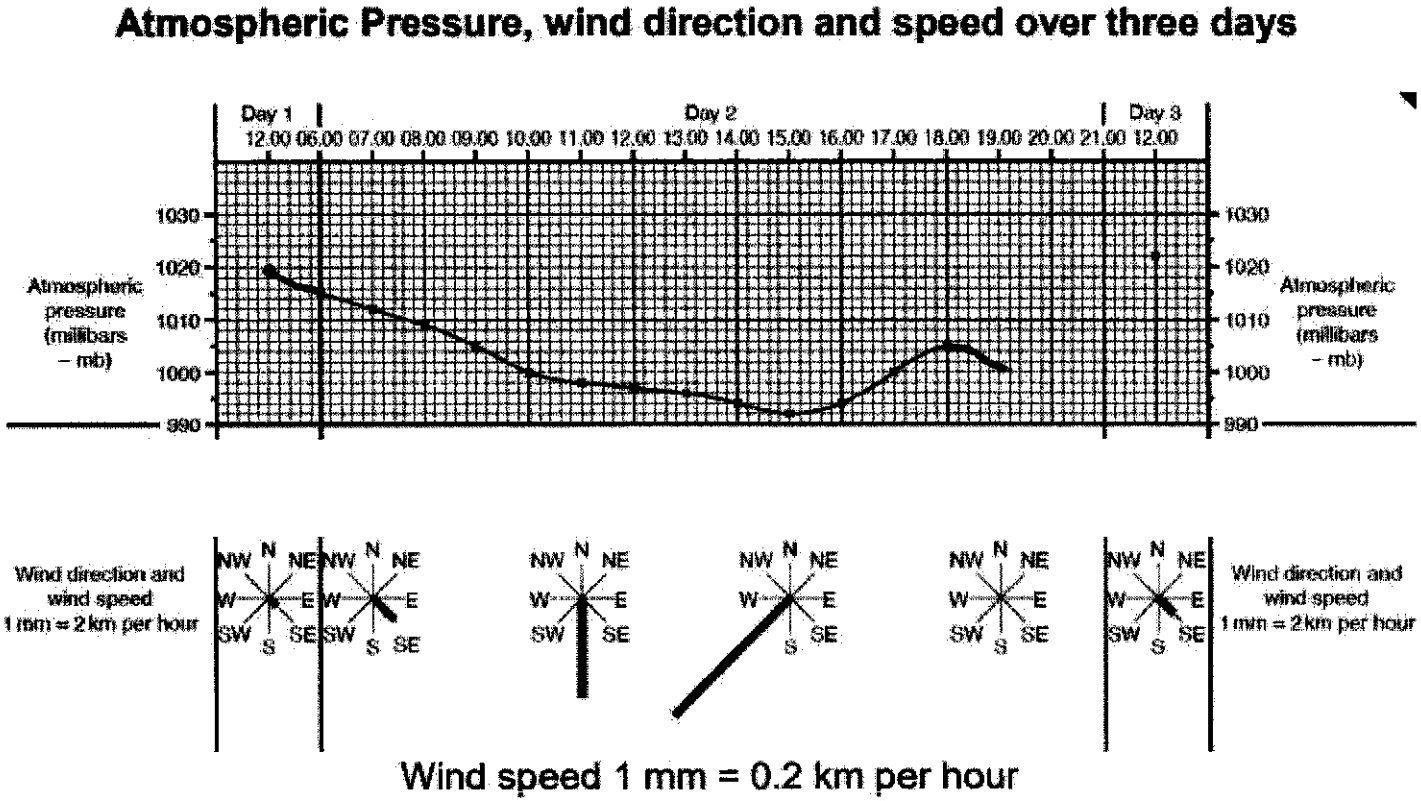


Fig. 5

Based on the data presented in Fig. 5, **discuss** whether the **hypothesis** that atmospheric pressure is the highest when wind speed is the strongest **is true**. **Support** your answer with **evidence**. [3]

1M	**Stating validity of hypothesis:** • Not true
1M	**Evidence:** • Day 2 1500 hrs, atmospheric pressure lowest at 920mb but wind speed was highest (4.6 km/hr). • Days 1 and 3, atmospheric pressure was highest (1020-1022mb), wind speed was low (at 0.4 km/hr & 0.6 km/hr respectively).

Based on the data presented in Fig. 5, discuss whether the hypothesis that atmospheric pressure is the highest when wind speed is the strongest is true. Support your answer with evidence. [3]

1M	**Anomaly:** • Day 2 between 1800 and 2000 hrs, no wind speed recorded at 1900 hrs, but atmospheric reading recorded at 1000mb.

3(a) **Explain** how an **international organisation has cooperated with countries** to **address climate change**. [4]

1M	The UN is an international organisation of countries that facilitate cooperation among countries regarding many issues, including climate change.
1M	The United Nations Framework Convention on Climate Change (UNFCCC) was set up with the goal **of reducing the levels of greenhouse gases in the atmosphere**.
1M	**Many countries came together to sign the Kyoto Protocol**, an international agreement linked to UNFCCC, to come up with measures to address climate change and put them into practice.

3(a) Explain how an international organisation has cooperated with countries to address climate change. [4]

1M	Under the protocol, **<u>various targets to reduce greenhouse gas emissions were set for participating countries</u>**.

4(a) **Explain** why **deserts** have a **very large diurnal temperature range**. [4]

1M	During the day, the absence of clouds allows large amounts of the sun's energy to reach the earth.
1M	The earth's surface heats up quickly, so the air near the earth's surface is warmer and temperatures may soar as high as 50°C.
1M	During the night, the absence of clouds allows more of the heat radiated from the earth's surface to escape into space.
1M	This cools the earth's surface quickly and the surface temperature drops drastically to as low as less than 10°C resulting in a large diurnal temperature range.

5(a) Fig. 6 shows information about an earthquake in Sumatra (2004) which triggered a tsunami. Fig. 7 shows the impact on coastlines severely hit by the tsunami.

How the tsunami in Sumatra could have formed in 2004

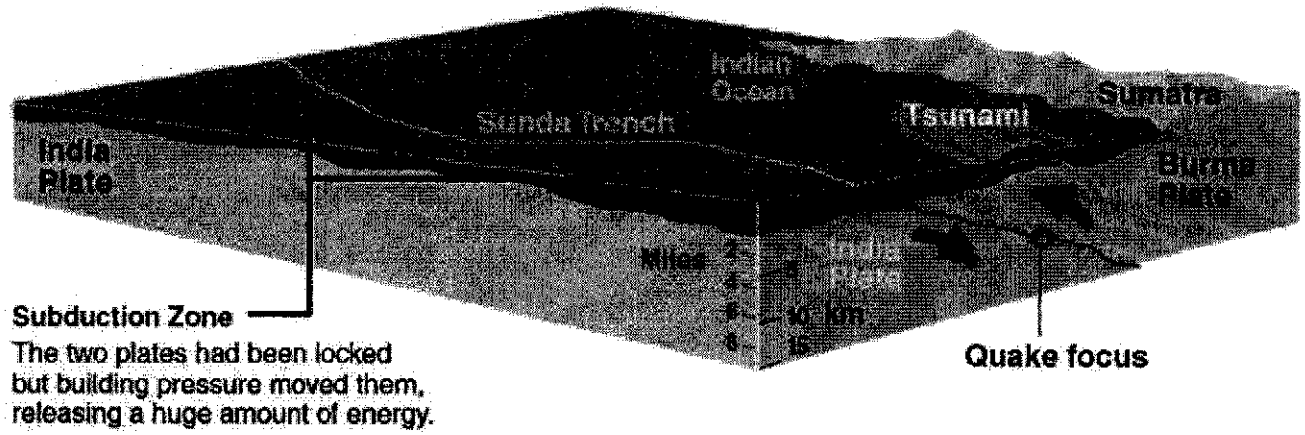
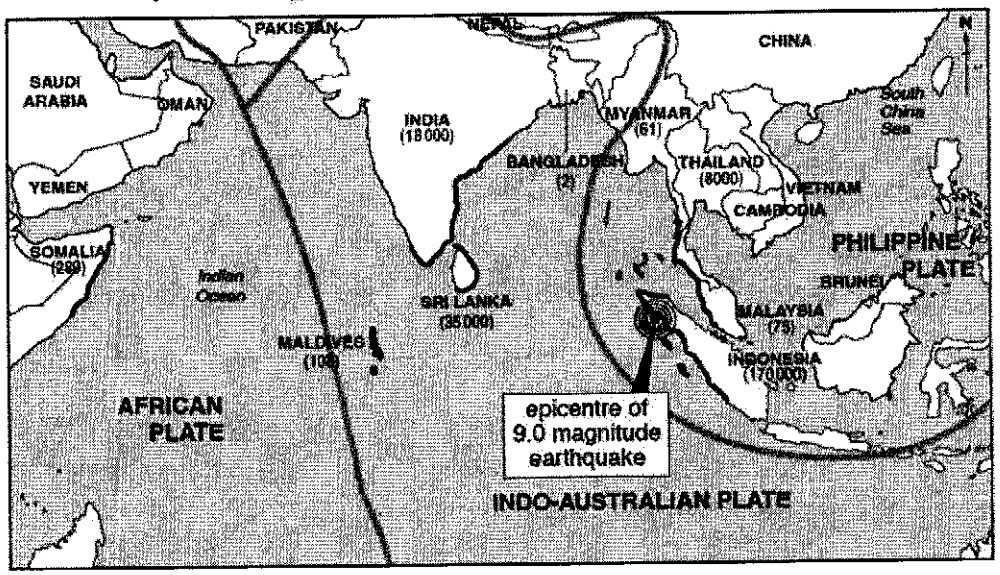


Fig. 6

5(a) Fig. 6 shows information about an earthquake in Sumatra (2004) which triggered a tsunami. Fig. 7 shows the impact on coastlines severely hit by the tsunami.

A map showing the impact the tsunami had on coastlines



Key

coastline severely hit by tsunamis

plate boundary

(61) number of deaths

Fig. 7

(i) **Use Fig. 6** to help you **explain** how the **tsunami in Sumatra** could have **formed**. [4]

1M	At the Sunda Trench, **the Indian Plate subducts further (move into) under the Burma Plate** OR the denser Indian Plate **subducts beneath** the Burma Plate
1M	Seismic energy from the earthquake **forces out a mass of sea water**.
1M	On **reaching shallower water**, **greater friction** forces the waves to slow down and **increase in height**.
1M	At the point of contact with the coast, the waves reach great heights and travel at speeds between 30-50 km/h.

(ii) **Use Fig. 7 and other information** you have learnt to **explain how and why** the **number of deaths varied** in different **countries and cities**. [5]

Award max 3M for explanation on **how** number of deaths varied

1M	Countries which are nearest to the epicentre of the earthquake OR/AND facing the direction of the tsunami had the greatest deaths , e.g Indonesia had the highest death (170,000) which was **closest to the epicentre** which means greatest impact from earthquake and tsunami.
1M	Countries with extensive coastlines and in the line of the tsunami had high number of deaths, e.g. 35,000 and 18,000 deaths from Sri Lanka and India respectively.

(ii) Use Fig. 7 and other information you have learnt to explain how and why the number of deaths varied in different countries and cities. [5]

Award max 3M for explanation on **how** number of deaths varied

1M	**Exception:** Malaysia, although close to but on the other side of epicentre, had only 75 deaths. OR Myanmar, even though about same distance as Sri Lanka from Indonesia, had only 61 deaths.

(ii) Use Fig. 7 and other information you have learnt to explain how and why the number of deaths varied in different countries and cities. [5]

Award 1M per reason **why** deaths varied; Accept other plausible answers

1M	Nearer to epicentre, the **impact of waves hitting coastline and sweeping into the coastal areas is high and more destructive**.
1M	**State of preparedness / effectiveness of warning systems**, e.g. tsunami warning systems able to reach people quick enough for them to evacuate to higher ground.

(6) Fig. 10 is a world map showing natural hazards of the world.

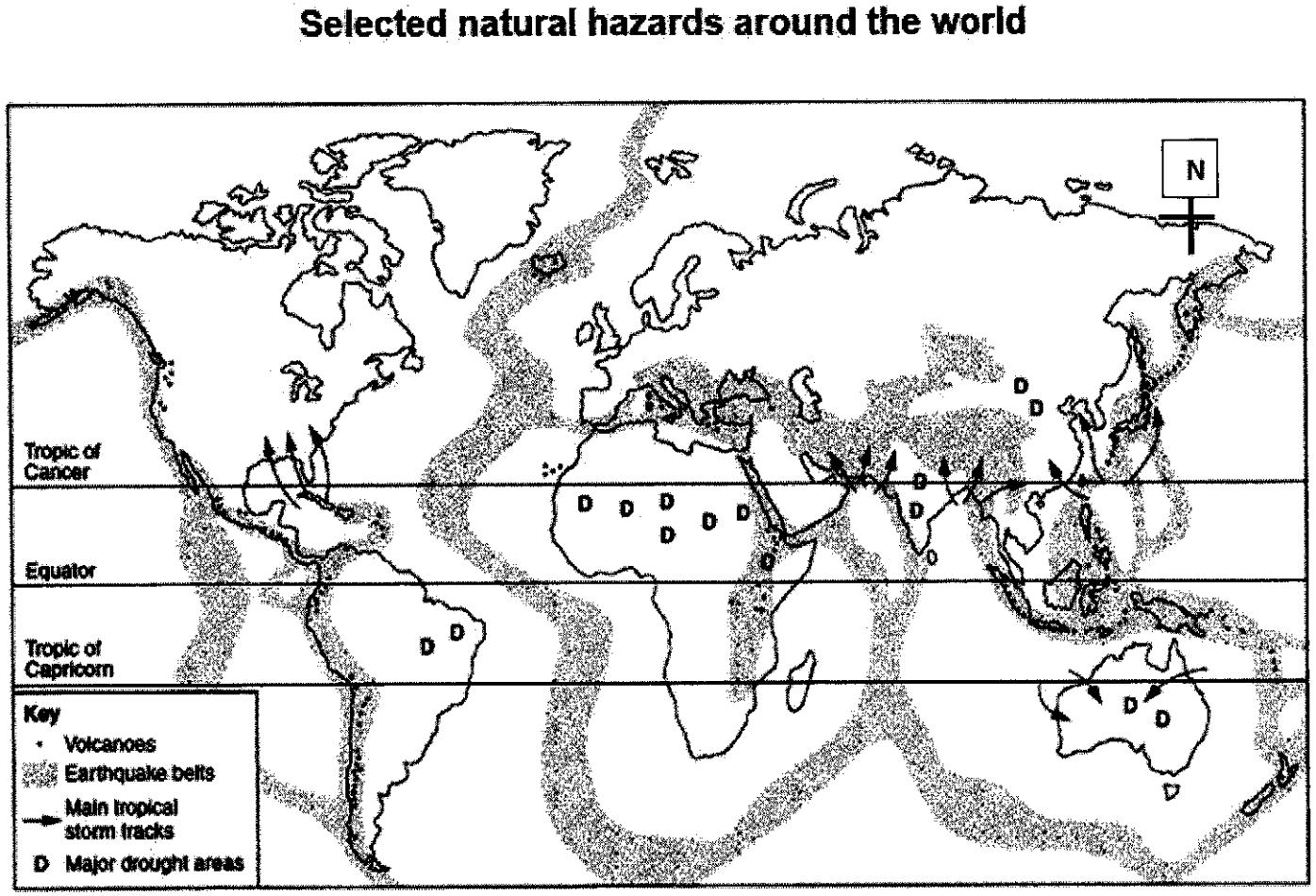


Fig. 10

(a) **Using Fig. 10**, **suggest how** these natural hazards can be **classified** and **compare their distribution**. [4]

1M	**Classification:** Tectonic and climate-related hazards
	Make valid comparisons
1M	Earthquake / volcanic belts are distributed across **all regions of the world** / **near tectonic boundaries**, whereas the climate-related hazards are mainly **confined to the tropical and temperate regions** (Tropic of Cancer and Tropic of Capricorn).

(a) Using Fig. 10, suggest how these natural hazards can be classified and compare their distribution. [4]

1M	Major drought areas are **found on continents only** whereas main tropical storm tracks are found in both **continents and oceans**.
1M	There are several regions where both **climatic-related and tectonic hazards occur together**, for example, both droughts and earthquakes/volcanoes can be found in North-eastern Africa.

6(b) Photograph C shows a famous landmark in Yosemite National Park, USA.

A famous landform in Yosemite National Park, USA

Photograph C

(i) **Describe** the **important geographical features** as seen in Photograph C. [5]

1M	Wide valley floor (foreground)
1M	Dense vegetated valley floor (foreground)
1M	Steep cliff face in block mountain (left middleground)
1M	Similar altitude of mountains (left and right middleground)
1M	Tall mountains (centre middleground) due to snowline

(ii) **Using Photograph C and other information** you have learnt, **outline how** the **landform** could have **formed**. [4]

1M	Found at **divergent plate boundaries where plates are pulled apart,** giving rise to parallel faults.
1M	**Tensional forces** from these movements result in parts of the crust being fractured.
1M	Along these sections, **crust can extend, and the central block subsides** between two parallel faults giving rise to rift valleys.
1M	The block of land that is **left standing higher than the surrounding land** is a block mountain.

6(c) Fig. 11 shows an earthquake-proof house designed by engineers.

Design of an earthquake-proof house

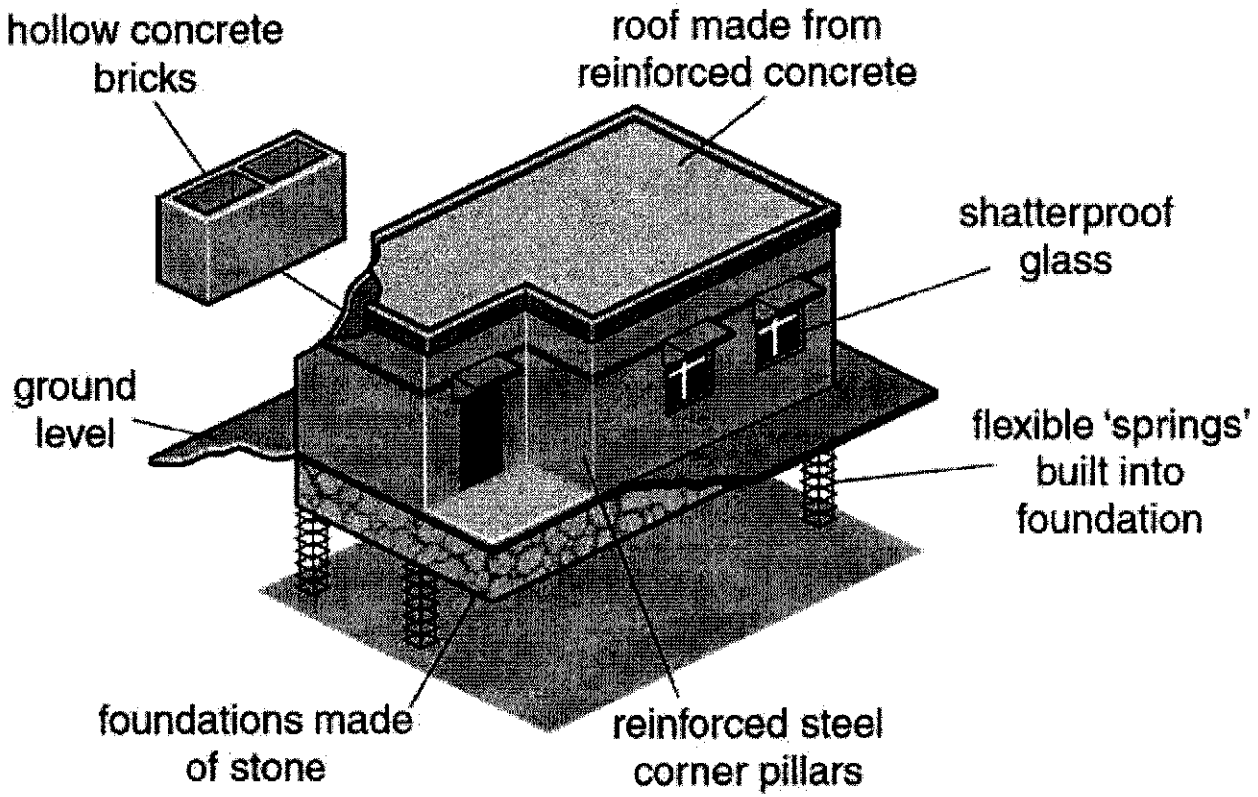


Fig. 11

Use Fig. 11 to help you **explain** how **four of the features** labelled would help to **protect people** if an **earthquake** occurred. [4]

Any 4 features.

1M	Hollow concrete blocks – less concrete materials means when it collapses, less injuries / easier to remove these materials during search and rescue operations to rescue victims.
1M	Roof made from reinforced concrete – less likely to break apart and injure people (especially the head region).
1M	Shatterproof glass – vibrations from earthquakes will not make it break / able to withstand vibrations, thus reducing cuts and injuries.

Use Fig. 11 to help you explain how four of the features labelled would help to protect people if an earthquake occurred. [4]

Any 4 features.

1M	Flexible 'springs' built into foundation – allows movement of the earthquakeproof house during earthquakes and so it will not collapse.
1M	Reinforced steel corner pillars – supports the house during an earthquake, thus less likely to collapse.