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EDEXCEL INTERNATIONAL GCSE GEOGRAPHY: QUESTIONS BY TOPIC

Hazardous Environments (Topic 3)

International GCSE Geography Topic 3

32 questions · 688 marks · Mark schemes included

Pearson Edexcel International GCSE (9–1) Geography 4GE1, Papers 1, 1R, 2 & 2R, June 2019 - June 2025

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic (exam questions, then fieldwork), oldest paper first.
Click any heading or question row below to jump straight to it.
On every question page, click ANSWER in the top-right corner to jump to its mark scheme.
Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

QUESTION	SOURCE	MARKS	PAGE
HAZARDOUS ENVIRONMENTS: EXAM QUESTIONS	16 questions · 400 marks		**3**
1. **Q3**	Paper 1 June 2019	25	**4**
2. **Q3**	Paper 1R June 2019	25	**11**
3. **Q3**	Paper 1 November 2020	25	**17**
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FIELDWORK: INVESTIGATING HAZARDOUS ENVIRONMENTS	16 questions · 288 marks		**101**
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25. **Q6**	Paper 1 June 2023	20	**129**
26. **Q6**	Paper 1R June 2023	20	**132**
27. **Q6**	Paper 1 November 2023	20	**135**
28. **Q6**	Paper 1 June 2024	20	**138**
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QUESTIONS

32 questions · 688 marks · grouped by sub-topic

SUB-TOPIC

HAZARDOUS ENVIRONMENTS: EXAM QUESTIONS

16 questions in this booklet

If you answer Question 3 put a cross in the box ☒

3 Hazardous Environments.

(a) Identify the statement below that best describes the epicentre of an earthquake.

(1)

☒	**A** the area around the earthquake on the surface
☒	**B** the point on the Earth's surface directly above the focus
☒	**C** the area around the earthquake underground
☒	**D** the location underground where the earthquake occurs

(b) (i) State **one** measure of earthquake intensity.

(1)

.....

(ii) State **one** characteristic of a volcanic eruption.

(1)

.....

(iii) Explain **one** cause of an earthquake event.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest a factor that influences the cause and another factor that influences the direction of tropical cyclones.

(4)

Cause:

Direction:

(d) Explain **one** way earthquakes can form tsunamis.

(3)

(e) Study Figure 3b in the Resource Booklet.

Identify **one** feature of this building that makes it more tsunami resistant.

(1)

(f) Explain why some countries are more vulnerable than others to the impacts of natural hazards.

(4)

(g) Study Figure 3c and Figure 3d in the Resource Booklet.

Analyse the use of hazard, vulnerability and risk mapping in reducing the impact of earthquakes.

(8)

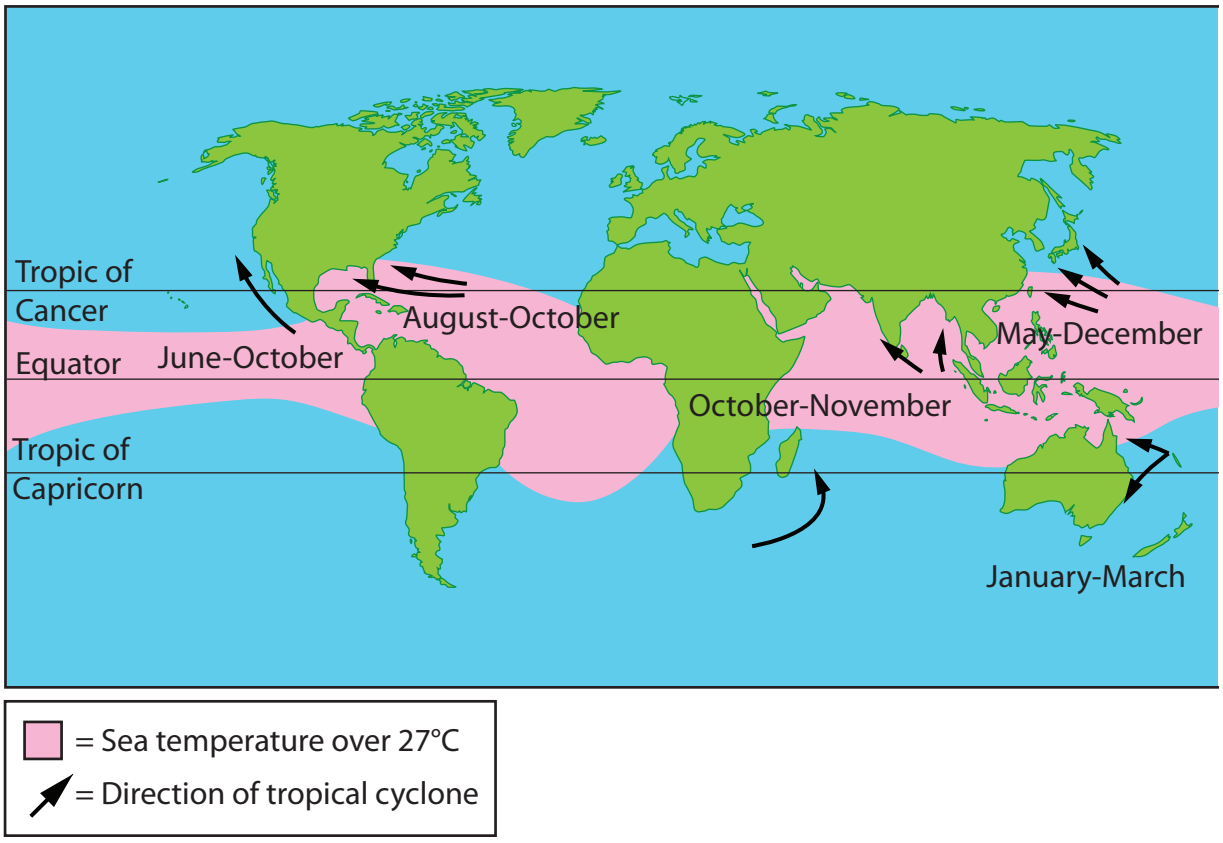


Figure 3a

Factors affecting the formation of tropical cyclones



(Source from: https://commons.wikimedia.org/wiki/File:Tsunami_shelter_near_Khao_Lak_Thailand.jpg)

Figure 3b

A tsunami resistant building

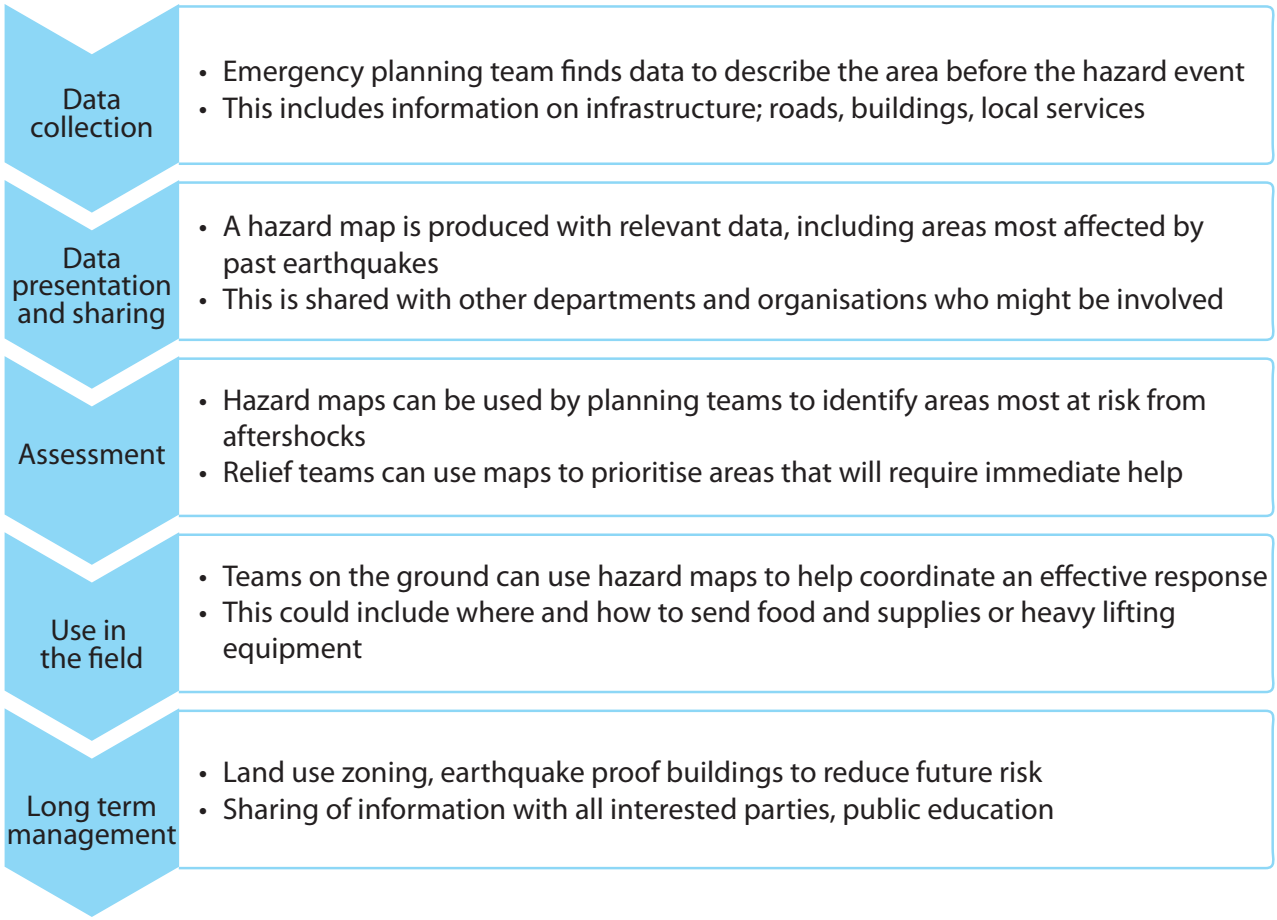
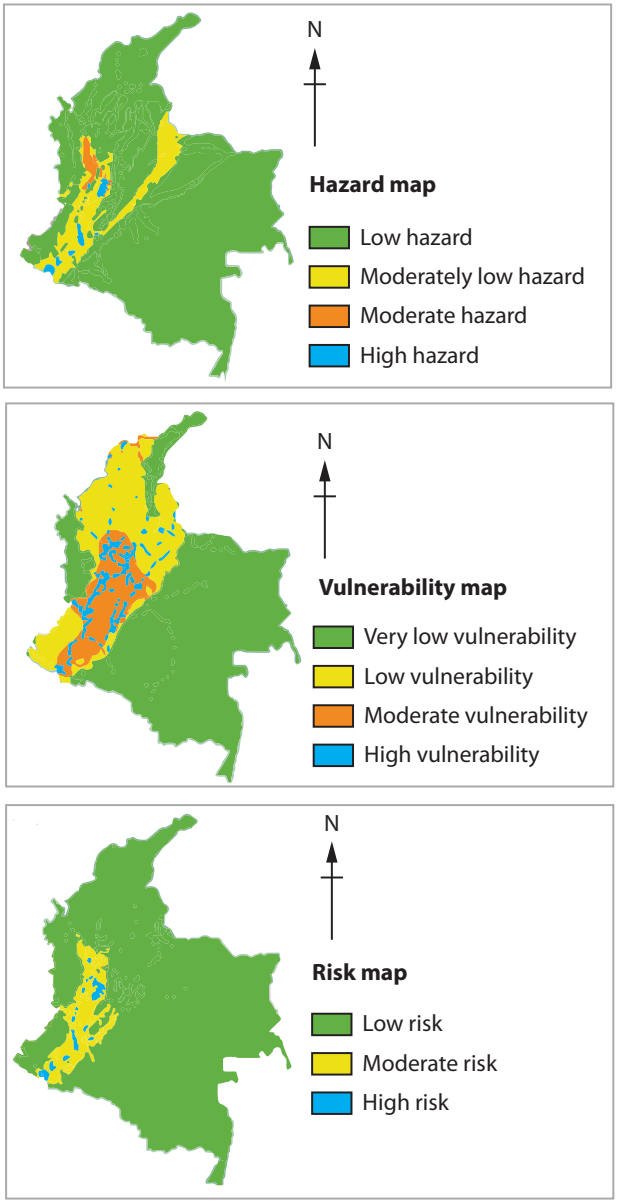


Figure 3c

Stages in hazard mapping



(Sourced from: Van Westen, C.J. (1997) Hazard, vulnerability and risk analysis. In: Cees van Westen, AsunciónSaldaña López, Patricia Uría Cornejo and Guillermo Chávez Ardanza (eds). ILWIS Applications Guide, p 1-18. https://www.itc.nl/ilwis/applications-guide/application-1/)

Figure 3d

An example of hazard, vulnerability and risk maps for tectonic events in a South American country

3 Hazardous Environments.

(a) Identify the statement below that best describes a destructive (convergent) plate margin.

(1)

☒	**A** the plates pull apart and magma rises
☒	**B** the plates push together and both plates are destroyed
☒	**C** the plates pull apart and volcanoes erupt
☒	**D** the plates push together and one plate is destroyed

(b) (i) Identify **one** measurement of a volcanic hazard.

(1)

☒	**A** Volcanic Mercalli Scale
☒	**B** Volcanic Saffir-Simpson Scale
☒	**C** Volcanic Explosivity Index
☒	**D** Volcanic Eruption Source

(ii) State **one** human factor that affects the impact of a tectonic hazard.

(1)

.....

(iii) Explain **one** physical impact of a volcanic eruption.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** factors that influence the distribution of a tropical cyclone.

(4)

1 .....

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2 .....

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(d) Explain **one** way a hotspot can lead to a tectonic hazard.

(3)

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(e) Study Figure 3b in the Resource Booklet.

Identify the building design characteristic in Box X that makes this building more resistant to collapse.

(1)

(f) Explain why people live in areas at risk from hazardous events.

(4)

(g) Study Figure 3c and Figure 3d in the Resource Booklet.

Analyse the use of GIS in managing earthquake risk.

(8)



KEY:
= Sea temperature range from 24°C to 27 °C
= Direction of tropical cyclone

Figure 3a

Characteristics of tropical cyclones



Figure 3b

An earthquake resistant building

("Sourced from: Te Ara – The Encyclopedia of New Zealand
Photograph by Alastair McLean")

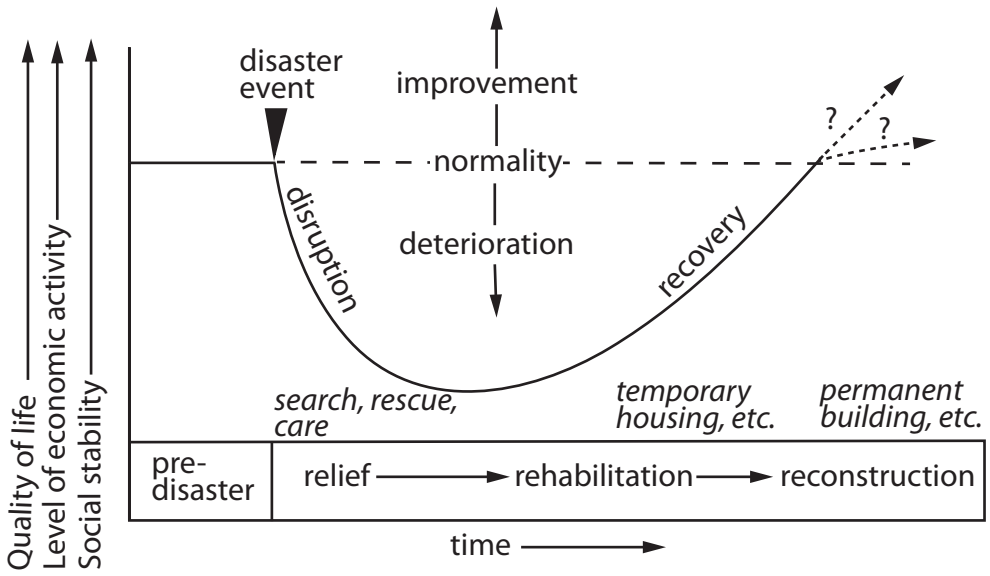


Figure 3c

A timeline to show the changes in quality of life for people living in regions affected by hazardous events

(Source from: © Chris Park)

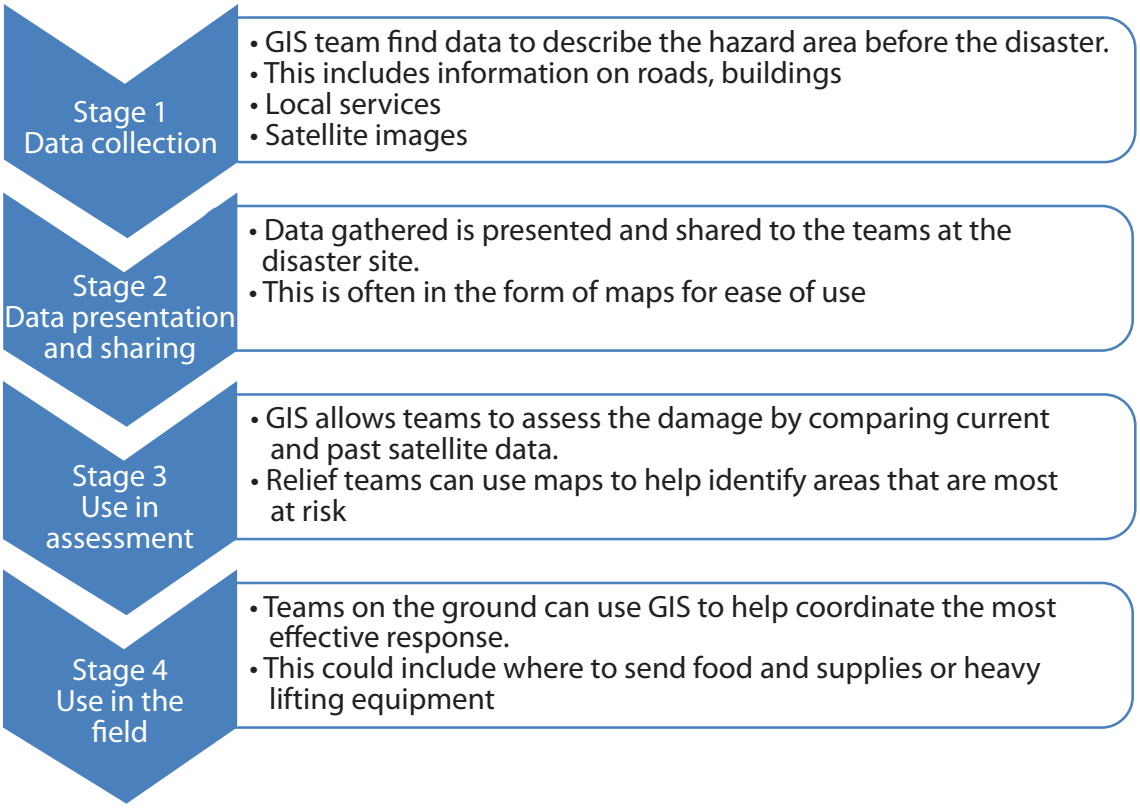


Figure 3d

Flow diagram showing how GIS supports short-term planning in response to natural hazards

3 Hazardous environments

(a) Identify the short-term response to a natural hazard.

(1)

☒	**A** emergency aid
☒	**B** risk assessment
☒	**C** hazard mapping
☒	**D** rebuilding programmes

(b) (i) Identify **one** social impact of a hazardous event.

(1)

☒	**A** roads damaged
☒	**B** buildings damaged
☒	**C** families separated
☒	**D** crops destroyed

(ii) State **one** method of measuring the magnitude of a natural hazard.

(1)

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(iii) Explain **one** way longer-term relief can reduce the impact of natural hazards.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** reasons why people live in areas at risk from tropical cyclones.

(4)

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(d) Explain **one** way in which government can help prepare the population for earthquake events.

(3)

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(e) Study Figure 3b in the Resource Booklet.

Identify X.

(1)

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(f) Explain the causes of an earthquake.

(4)

(g) Study Figure 3c in the Resource Booklet.

Analyse the differences between the tropical cyclone hazards and impacts.

(8)





Figure 3a

Living in areas prone to tropical cyclones

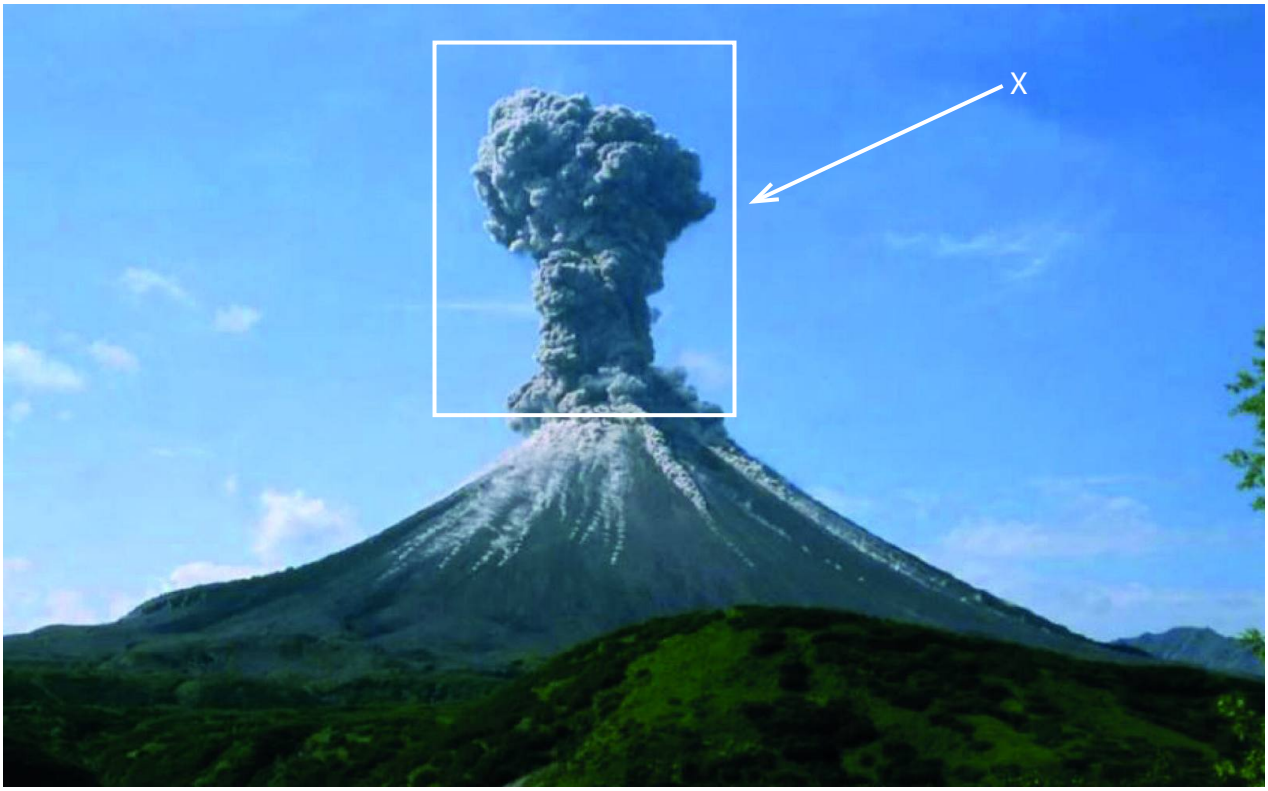


Figure 3b

A volcanic eruption





Name of cyclone	Yasi	Sandy
Country	Australia	USA
Date	2011	2012
Death toll/ injuries	1	100+
Wind speed max	290 kph	155 kph
Size of storm	600 km wide	1500 km wide
Level of urbanisation	Low	High
Cost US$	3.6 billion	70.2 billion

Figure 3c

Information about two different tropical cyclones

If you answer Question 3 put a cross in the box ☒.

3 Hazardous environments

(a) Identify the longer-term response to a hazardous event.

(1)

☒	**A** emergency medical aid
☒	**B** provision of bottled water
☒	**C** food parcels
☒	**D** rebuilding settlements

(b) (i) Identify **one** physical impact of a tropical cyclone.

(1)

☒	**A** buildings damaged
☒	**B** family separation
☒	**C** lack of food
☒	**D** ground shaking

(ii) State **one** method of measuring the scale of tropical cyclones.

(1)

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(iii) Explain **one** way short-term relief helps reduce the impact of earthquakes.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** physical reasons why people live in areas at risk from volcanic eruptions.

(4)

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(d) Explain **one** longer-term impact of a tropical cyclone.

(3)

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(e) Study Figure 3b in the Resource Booklet.

Identify the feature at X.

(1)

(f) Explain the formation of destructive plate boundaries.

(4)

(g) Study Figures 3c and 3d in the Resource Booklet.

Analyse the differences between the earthquake events.

(8)

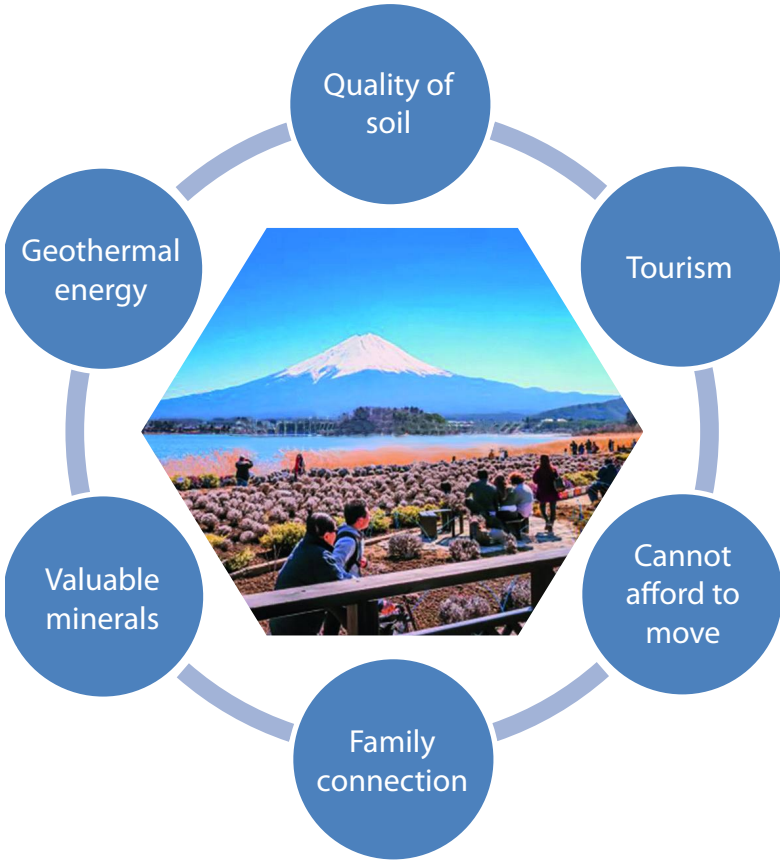


Figure 3a

Living in volcanic zones

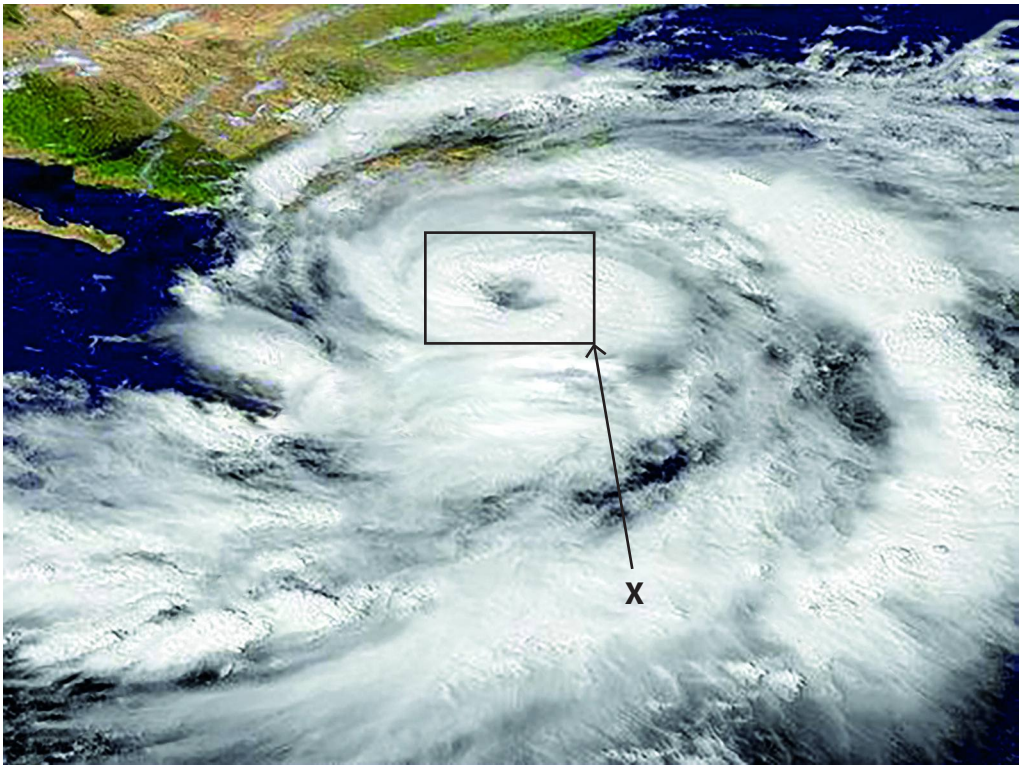


Figure 3b

Hurricane Patricia over the Pacific

Earthquake	Haiti	Japan
Date	2010	2011
Death toll/Injuries	230,000	28,000
GNI per capita (measure of development)	760	38,550
Aftershocks	52	200+
Level of preparedness	None	1 min warning signal
Level of urbanisation	Low	High
Cost billion US$	14	309

Figure 3c

Information about two different earthquake events

The earthquake off the east coast of Honshu, Japan's largest island, was the fifth-largest ever recorded.

Seismic energy:
Each step on the magnitude scale is 10 times more powerful than the previous step. Circles represent the seismic energy to scale.

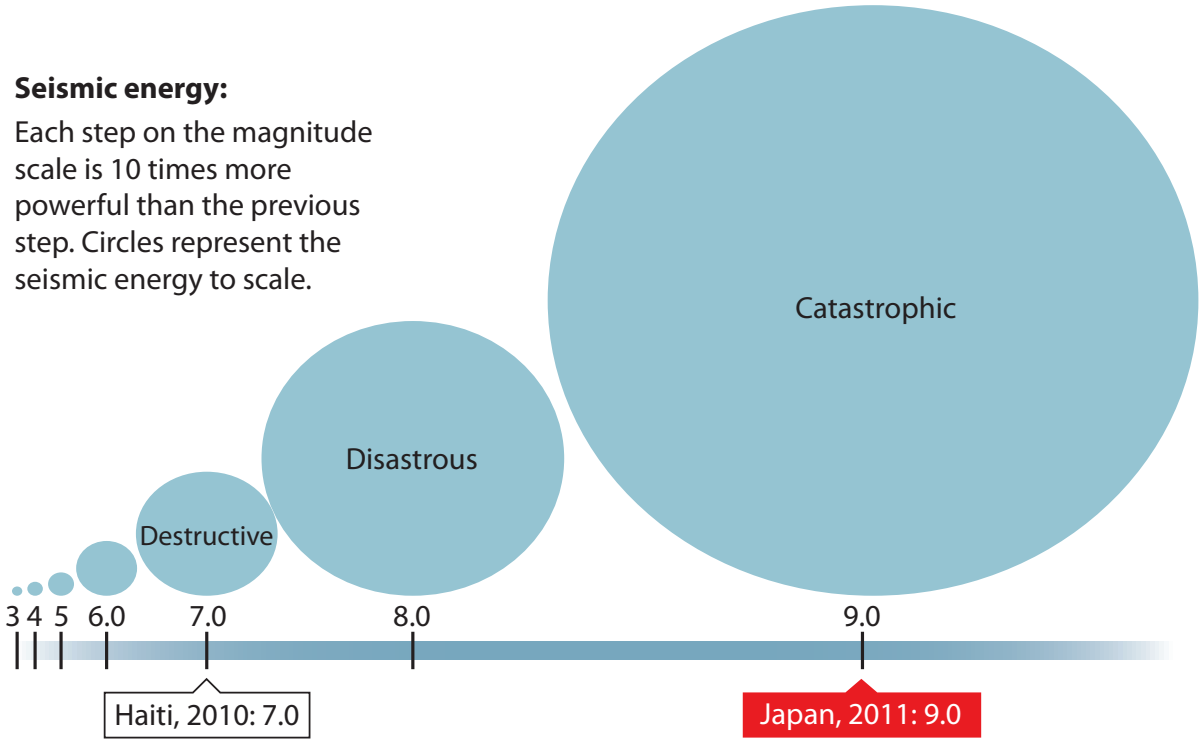


Figure 3d

Earthquake magnitude and location

If you answer Question 3 put a cross in the box ☒

3 Hazardous environments

(a) Identify which of the following can be used to record earthquakes.

(1)

☒	**A** Flow meter
☒	**B** Hygrometer
☒	**C** Richter scale
☒	**D** Seismograph

(b) (i) Identify a method of measuring tropical cyclones.

(1)

☒	**A** Bradshaw scale
☒	**B** Pressure scale
☒	**C** Saffir-Simpson scale
☒	**D** Wind speed scale

(ii) State **one** factor that influences the development of tropical cyclones.

(1)

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(iii) Explain **one** physical impact of a tropical cyclone hazard.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** reasons why some places are more vulnerable to tectonic hazards than others.

(4)

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(d) Explain **one** strategy to reduce the impacts from earthquake events.

(3)

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(e) Study Figure 3b in the Resource Booklet.

Identify the type of plate boundary.

(1)

(f) Explain the formation of a volcano.

(4)

(g) Study Figure 3c in the Resource Booklet.

Analyse the short- and long-term impacts of the earthquake event.

(8)

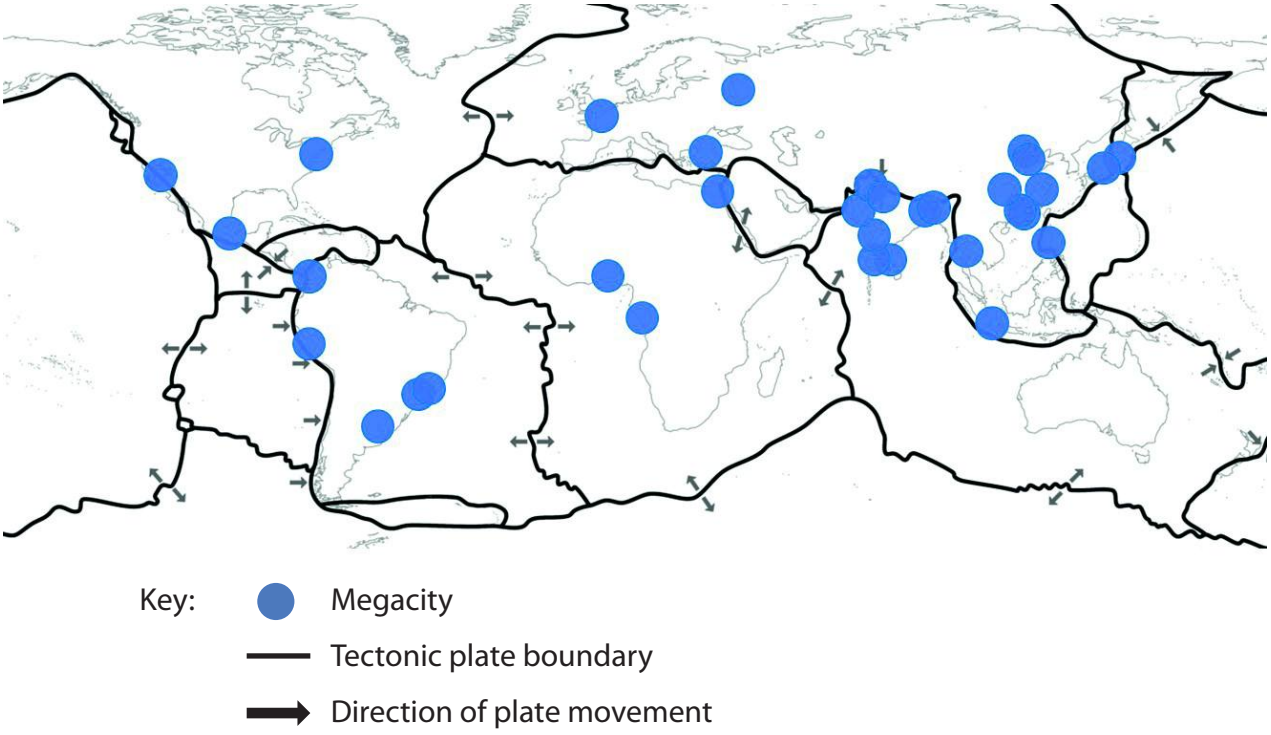


Figure 3a

Tectonic plate boundaries and megacity locations

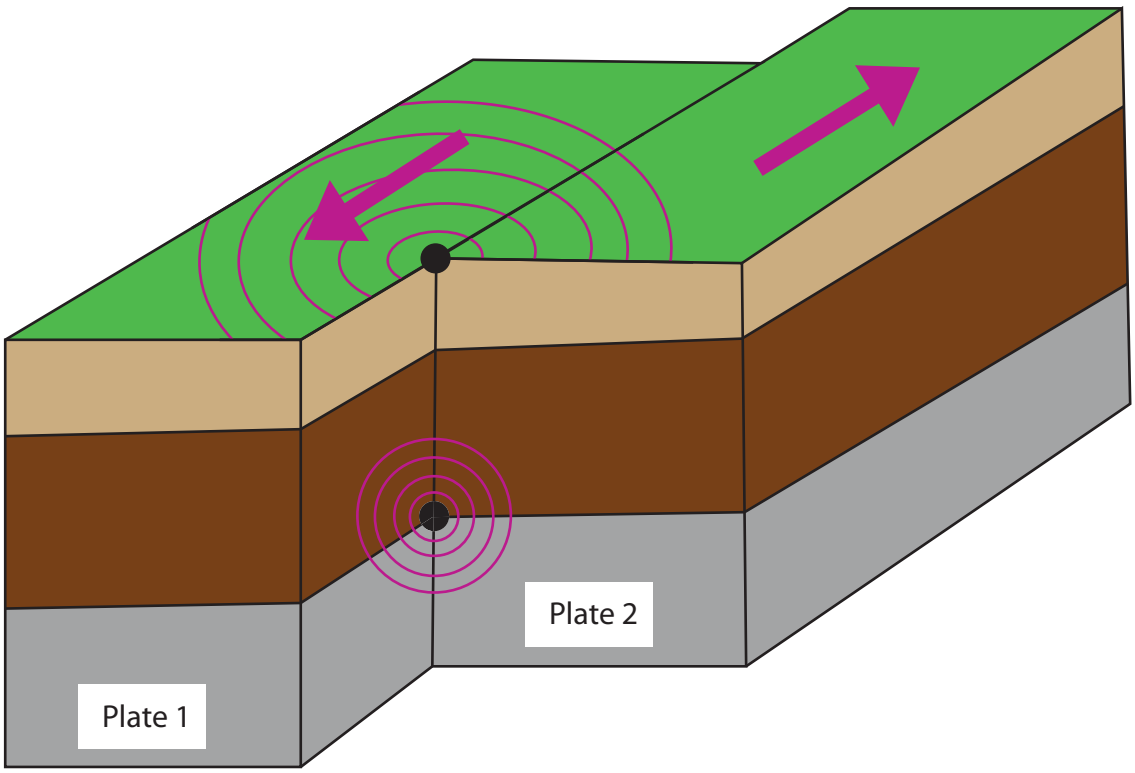
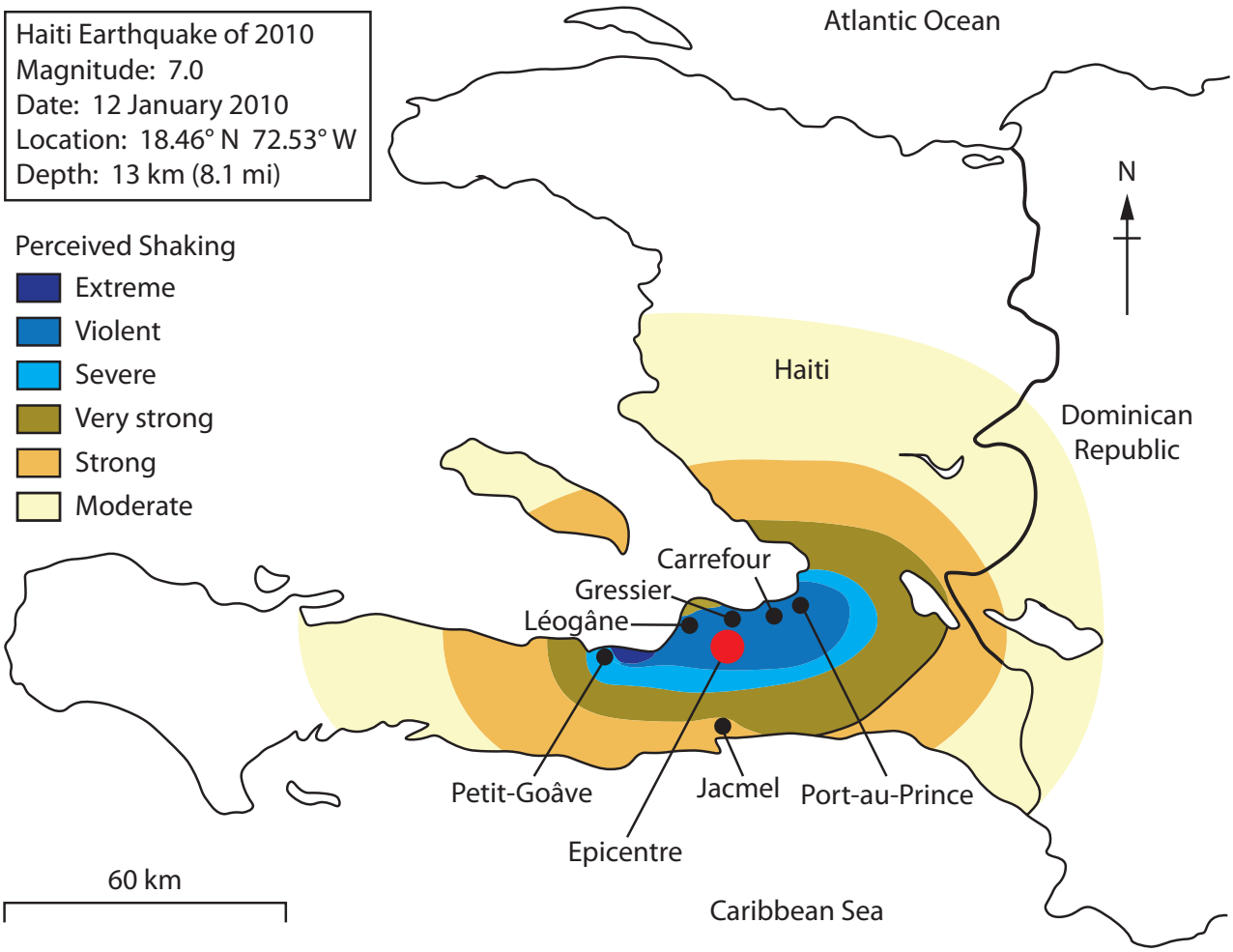


Fig 3b

Diagram of a plate boundary



Population	9.95 million
Short-term Impacts	• 220,000 people killed • 300,000 people injured • Transport and communications disrupted, airport damaged • Shortage of aid supplies due to lack of preparation
Long-term Impacts	• 2 million people with poor access to food and water • 1.3 million people homeless • Outbreaks of cholera • Many businesses were destroyed particularly the clothing industry

Figure 3c

Details about an earthquake event in Haiti, a developing country in 2010

If you answer Question 3 put a cross in the box ☒

3 Hazardous environments

(a) Identify the factor that produces the occurrence of an earthquake.

(1)

☒	**A** Ocean surface movement
☒	**B** Tsunami wave formation
☒	**C** Tectonic plate movement
☒	**D** Average temperature change

(b) (i) Identify a way to help plan for tropical cyclone hazards.

(1)

☒	**A** Monitor earth movement with a seismograph.
☒	**B** Satellite technology to track development of storms.
☒	**C** Send emergency aid to countries that experience cyclones.
☒	**D** Monitor any changes in groundwater levels.

(ii) State **one** reason why people continue to live in areas at risk from natural hazard events.

(1)

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(iii) Explain **one** economic impact of a tropical cyclone hazard.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** reasons why some populations are more at risk from the impacts of tropical cyclones than others.

(4)

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(d) Explain the cause of an earthquake.

(3)

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(e) Study Figure 3b in the Resource Booklet.

Identify **one** hazard associated with the volcanic eruption.

(1)

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(f) Explain why volcanoes do not always form on plate boundaries.

(4)

(g) Study Figure 3c in the Resource Booklet.

Analyse the different strategies for preparing for earthquakes.

(8)

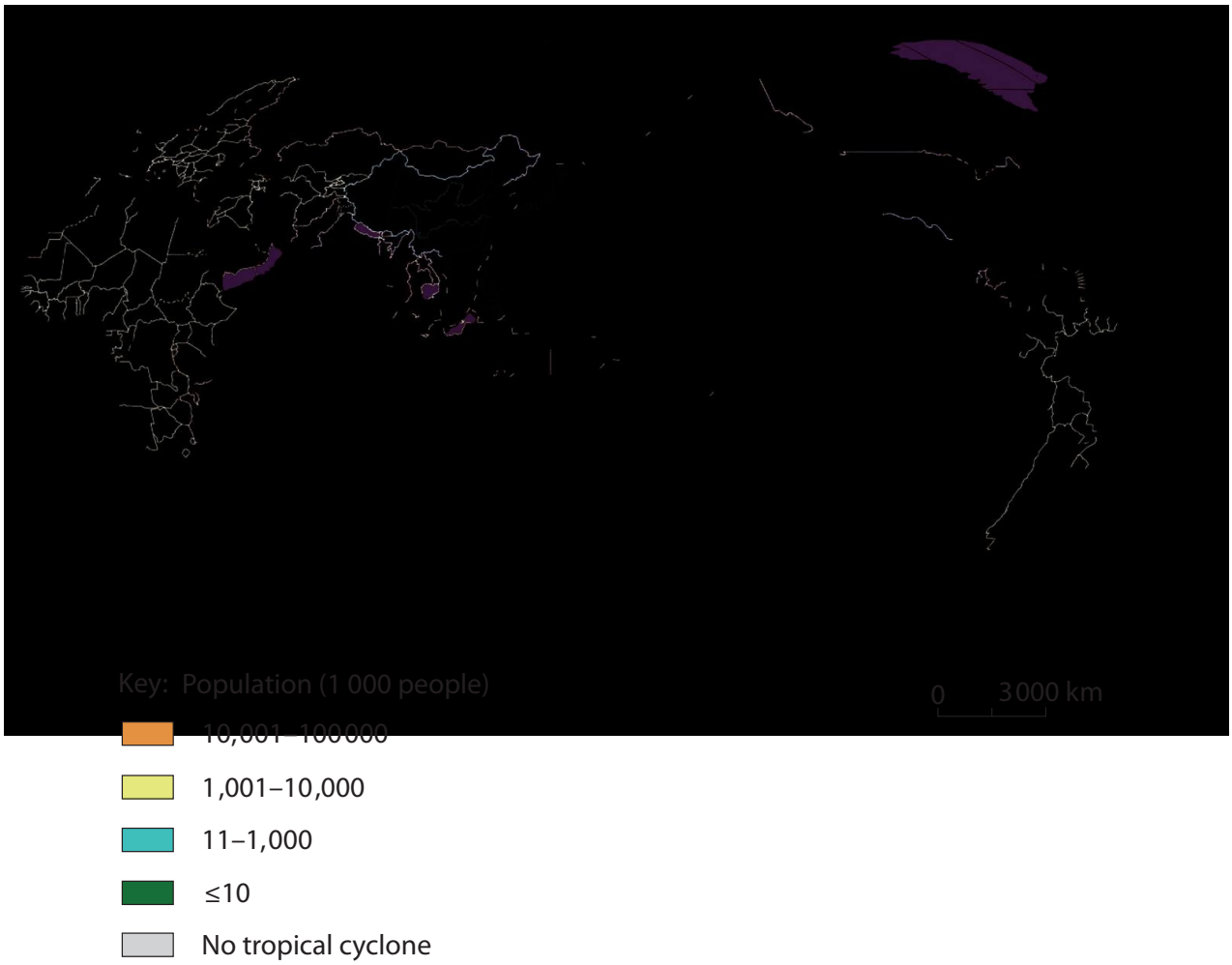


Figure 3a

Map showing populations at risk from tropical cyclones



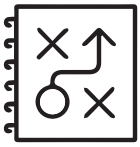
Figure 3b

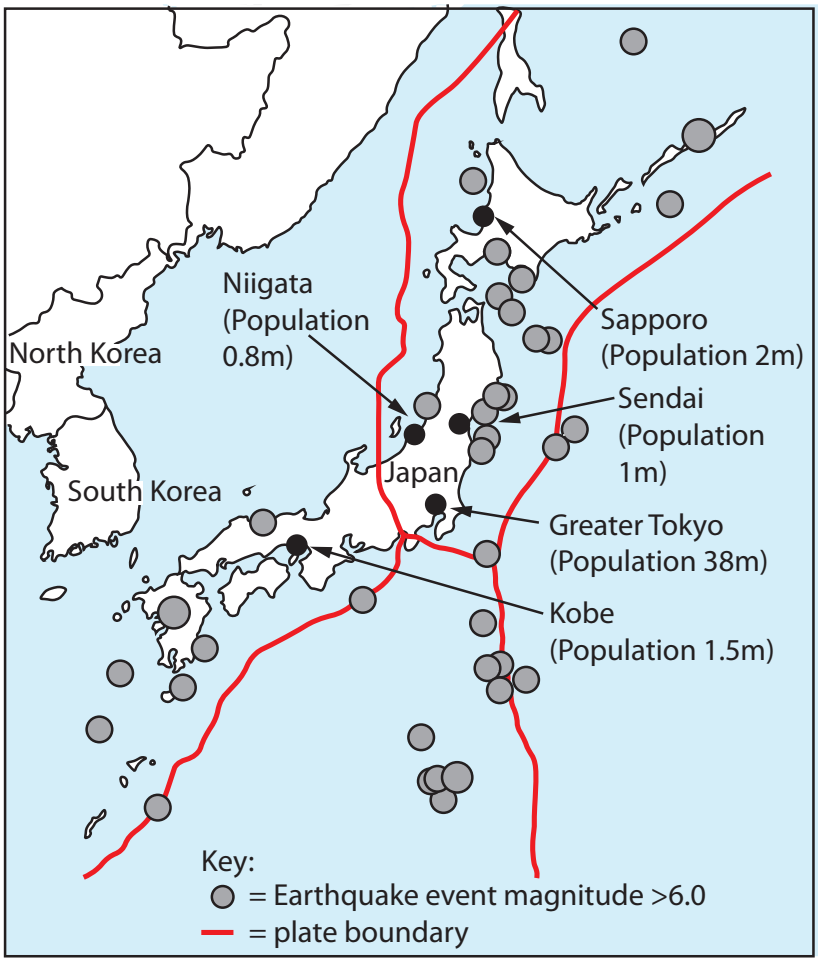
A volcanic eruption in Guatemala

Early warning systems sending text messages to people who may be at risk when seismic movement detected.



Evacuation plans in place with designated exit routes and shelters.

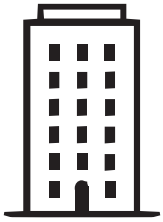




Education about procedures to follow during an earthquake event.



New buildings are designed to withstand ground movement due to earthquakes.



Emergency services well trained for rapid response.
Medical and food supplies stored in key locations.
Most families have their own survival kits.



Figure 3c

Japan's vulnerability to and preparations for earthquakes

If you answer Question 3 put a cross in the box ☒

3 Hazardous environments

(a) Identify a type of plate boundary.

(1)

- ☒ **A** asymmetrical
- ☒ **B** constructive
- ☒ **C** hot spot
- ☒ **D** mantle

(b) (i) Identify **one** characteristic of a tropical cyclone.

(1)

- ☒ **A** area of very high pressure
- ☒ **B** very little rainfall
- ☒ **C** low wind speeds
- ☒ **D** eye in the centre

(ii) State **one** factor that can affect tropical cyclone formation.

(1)

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(c) Explain **one** long-term impact of a tropical cyclone.

(2)

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(d) Study Figure 3a in the Resource Booklet.

Explain **two** reasons why people continue to live in areas at risk from volcanoes.

(4)

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(e) Explain **one** way building design can help prepare for earthquakes.

(3)

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(f) Study Figure 3b in the Resource Booklet.

Identify a potential short-term impact of the hazard shown.

(1)

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(g) Explain how volcanoes are formed at a destructive plate boundary.

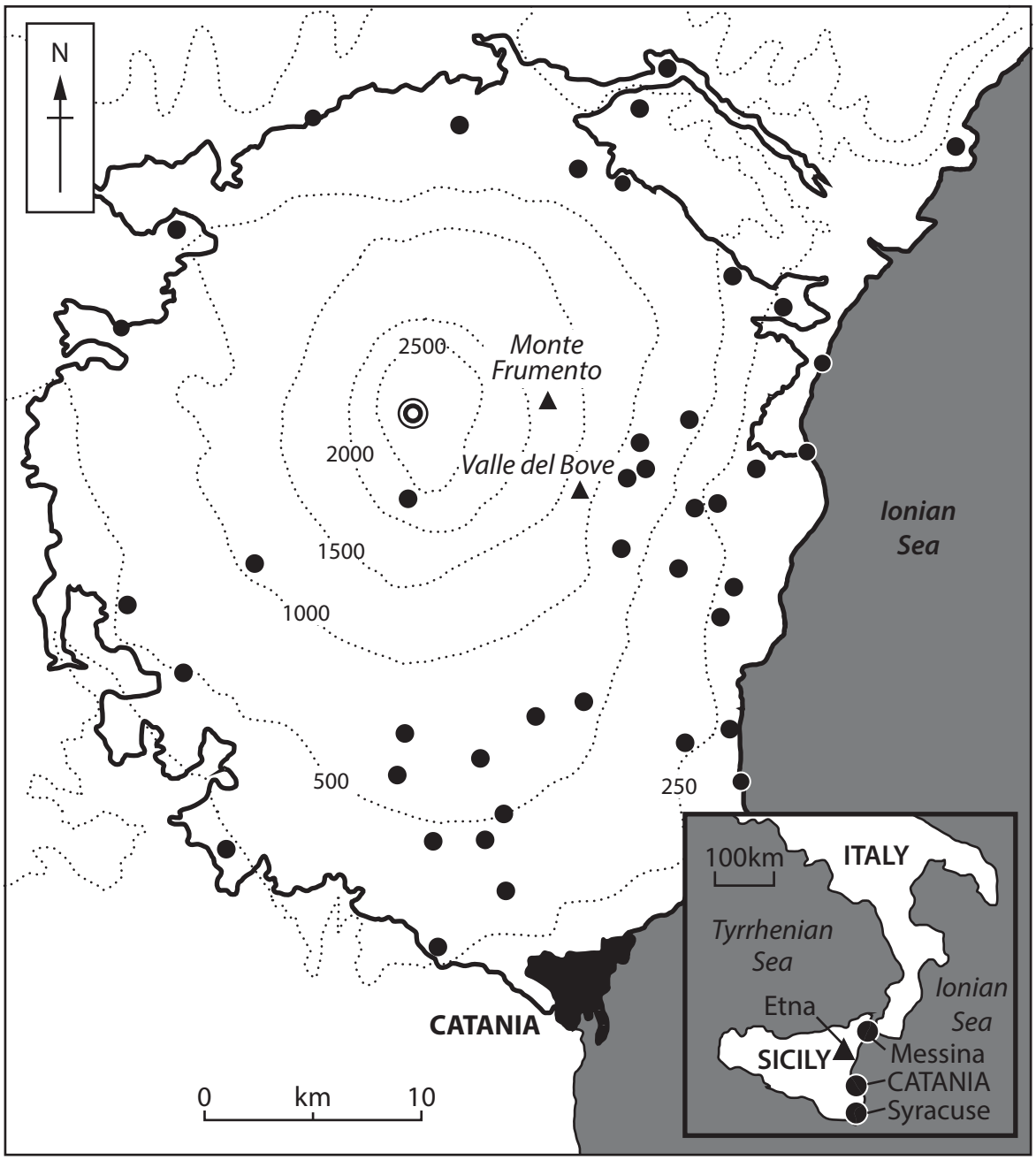
(4)

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(h) Study Figure 3c in the Resource Booklet.

Analyse the hazard risk from this predicted distribution of tropical cyclones.

(8)



Mt Etna is Europe's most active volcano with 200 eruptions since 1500 BCE

Significant eruptions in 2002–03, 2007, 2015, 2017, 2019, 2020–21

Key

Summit crater

Limit of volcanic rock

···500··· Contours in metres

Settlement

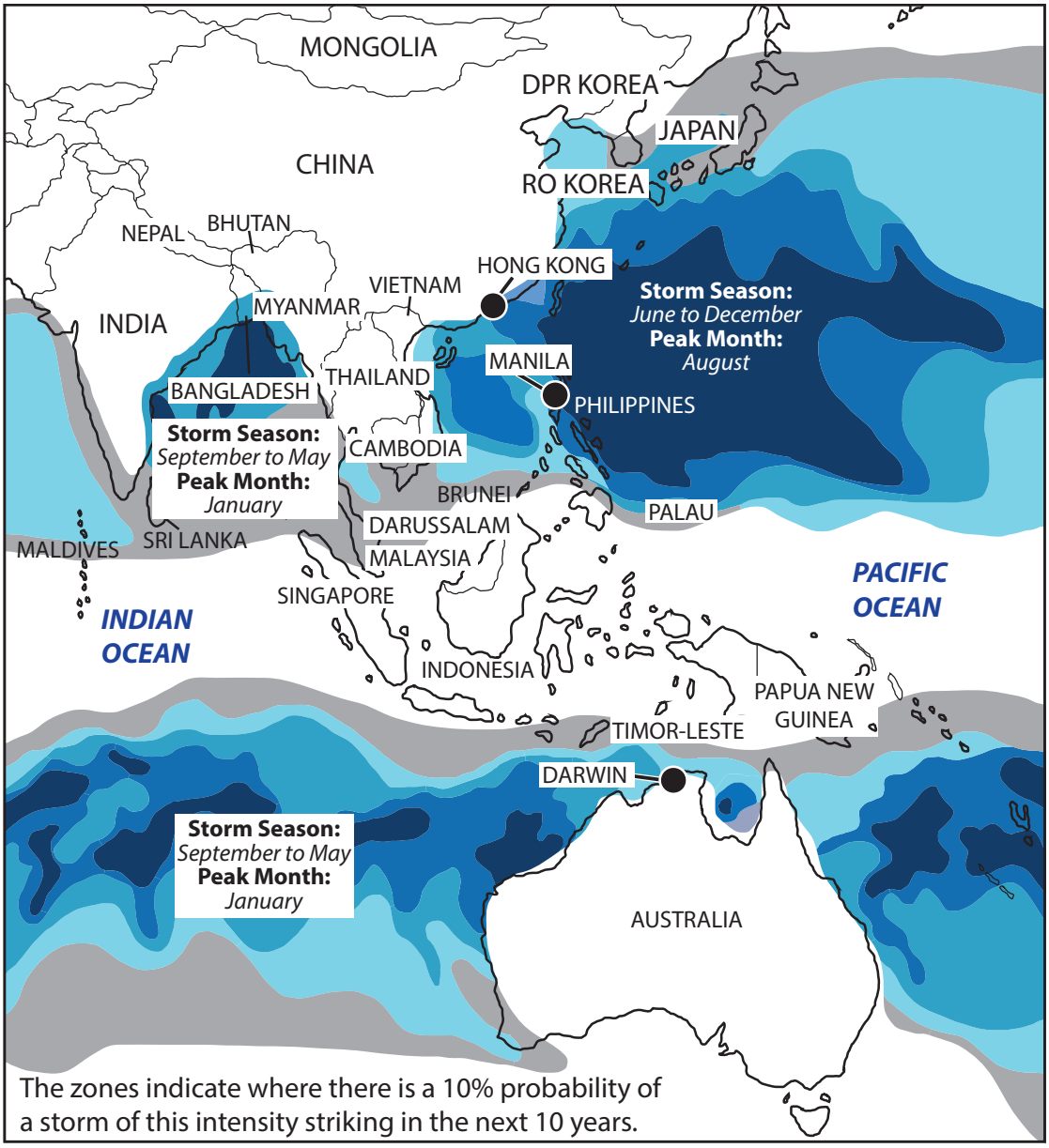
Figure 3a

Information about Mount Etna's eruptions and settlement distribution



Figure 3b

Tropical cyclone approaching Bangalore, India



Key: Tropical Cyclone Intensity Saffir-Simpson Scale

- One: 118–153 km/h
- Two: 154–177 km/h
- Three: 178–209 km/h
- Four: 210–249 km/h
- Five: 250 + km/h

Hong Kong, China	Population: 7.50 million • Observatory issuing advice and warnings. • Public education programme about cyclone preparedness.
Manila, Philippines	Population: 1.84 million • Tropical cyclone early warning system. • Community evacuation routes.
Darwin, Australia	Population: 0.13 million • Building standards to ensure can withstand high winds.

Figure 3c

Information on predicted tropical cyclones and preparation measures

3 Hazardous environments

(a) Identify a feature of a tropical cyclone.

(1)

- ☒ **A** crater
- ☒ **B** constructive
- ☒ **C** eye
- ☒ **D** mantle

(b) (i) Identify the best definition of an earthquake epicentre.

(1)

- ☒ **A** point on the earth's surface where tectonic plates meet
- ☒ **B** point in the earth's crust that collapses
- ☒ **C** point in the earth's crust where lava escapes
- ☒ **D** point on the earth's surface directly above the focus

(ii) State **one** factor that can affect how much damage an earthquake can cause.

(1)

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(c) Explain **one** factor that affects the distribution of tropical cyclones.

(2)

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(d) Study Figure 3a in the Resource Booklet.

Explain **two** reasons why people continue to live in areas at risk of tropical cyclones.

(4)

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(e) Explain **one** way hazard mapping can help preparation for an earthquake event.

(3)

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(f) Study Figure 3b in the Resource Booklet.

Suggest a long-term impact of the hazard shown.

(1)

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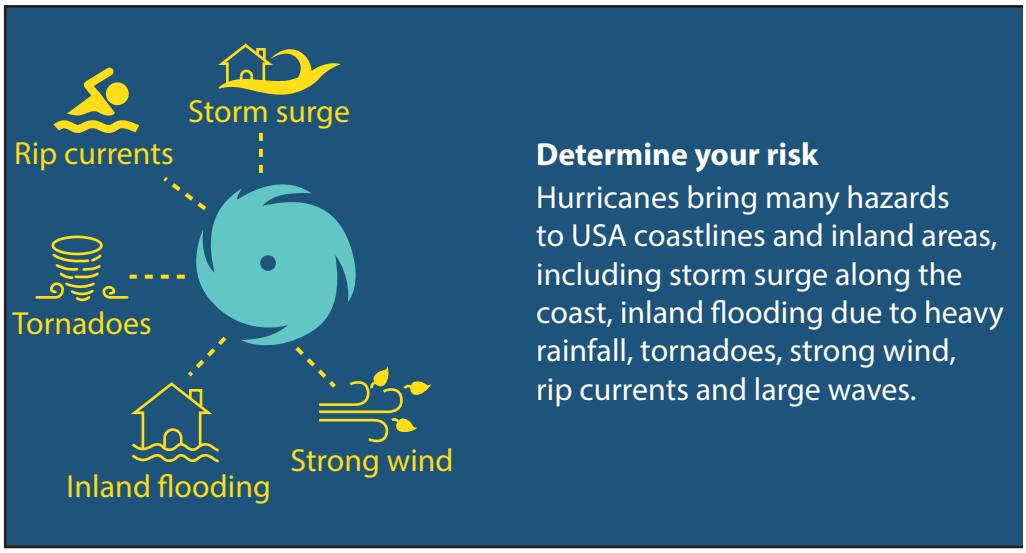
(g) Explain why earthquakes occur at destructive plate margins.

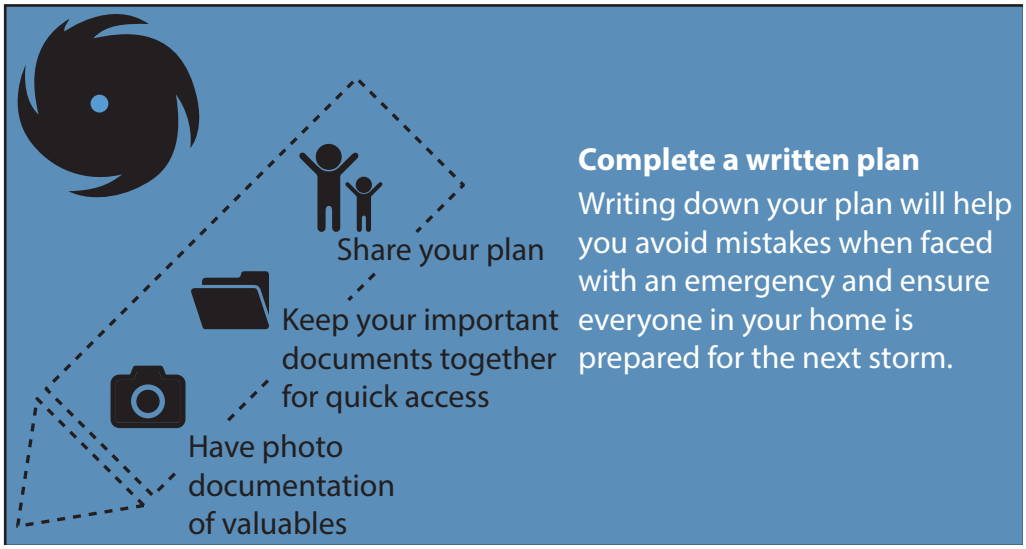
(4)

(h) Study Figure 3c in the Resource Booklet.

Analyse reasons for the different impacts of the two volcanic eruptions shown.

(8)





Note: Hurricanes are a type of tropical cyclone

Figure 3a

Information for people living in areas at risk of tropical cyclones in the USA



Figure 3b

Port au Prince, Haiti, after the 2010 earthquake

Eruption	Information
Anak Krakatau, Indonesia 2018  	• Triggered a tsunami. • 14,059 people injured. • 429 deaths. • Destroyed 2,752 houses and 510 ships. • Eruption reduced the volcano's height from 338 to 100m.
Volcán de Fuego, Guatemala 2018  	• 190 deaths. • 4,000 people evacuated. • Pyroclastic flows hit several towns and villages and blocked transport routes. • Ash reached the capital, Guatemala City, and closed the international airport.

Figure 3c

Information on two volcanic eruptions

3 Hazardous environments

(a) Identify the hazard often associated with earthquakes.

(1)

- ☒ **A** landslide
- ☒ **B** volcanic bombs
- ☒ **C** heavy rain
- ☒ **D** high wind speeds

(b) (i) Identify the statement that best defines a constructive plate margin.

(1)

- ☒ **A** tectonic plates collide
- ☒ **B** tectonic plates move towards each other
- ☒ **C** tectonic plates pull apart
- ☒ **D** tectonic plates move alongside each other

(ii) Define the term **hot spot**.

(1)

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(c) Explain **one** way people can prepare for earthquakes.

(2)

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(d) Study Figure 3a in the Resource Booklet.

Suggest **two** reasons why tropical cyclones can cause damage.

(4)

1 .....

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2 .....

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(e) Explain **one** reason why emergency aid can be important for responding to earthquake events.

(3)

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(f) Study Figure 3b in the Resource Booklet.

Identify the feature shown at **X**.

(1)

.....

(g) Explain **two** hazards associated with volcanic eruptions.

(4)

1 .....

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2 .....

(h) Study Figure 3c and Figure 3d in the Resource Booklet.

Analyse possible reasons why some countries are more vulnerable to the impact of earthquakes.

Refer to the resources in your answer.

(8)

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Saffir-Simpson hurricane wind scale

Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
Minimal damage	Moderate damage	Extensive damage	Extreme damage	Catastrophic damage
				
Winds **119–153 kph**	Winds **154–177 kph**	Winds **178–208 kph**	Winds **209–251 kph**	Winds **252 kph and more**

Figure 3a

Diagrams of tropical cyclone damage

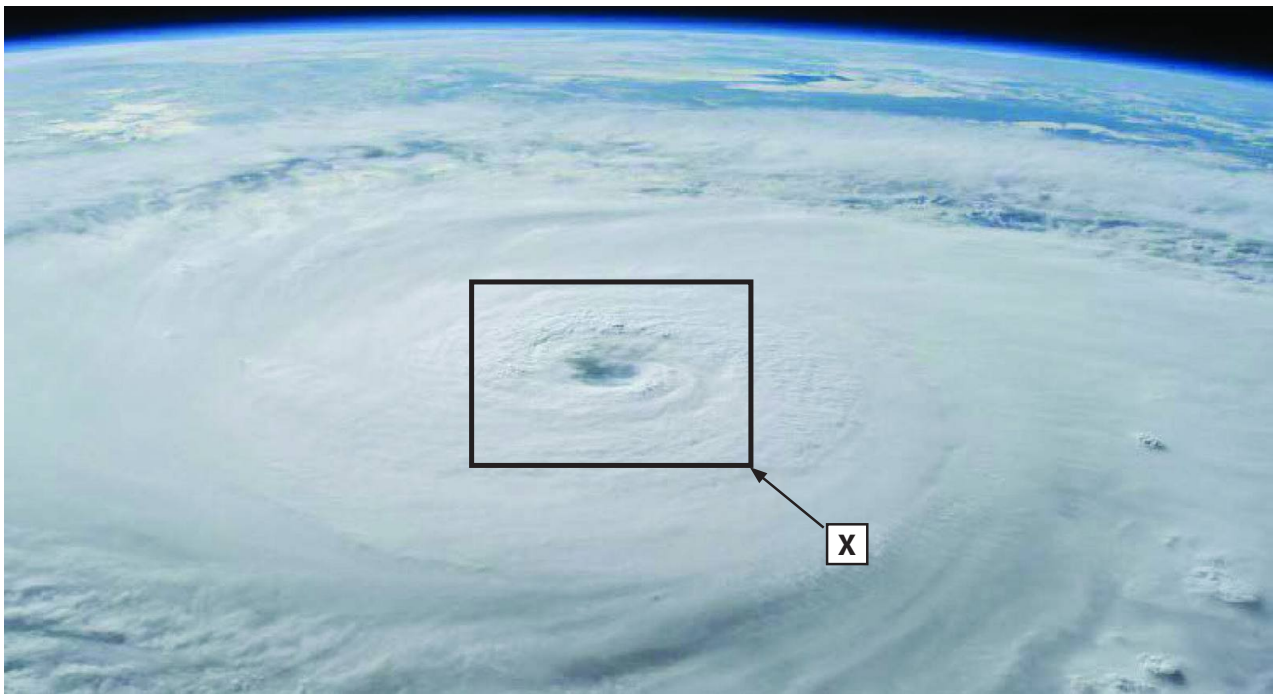
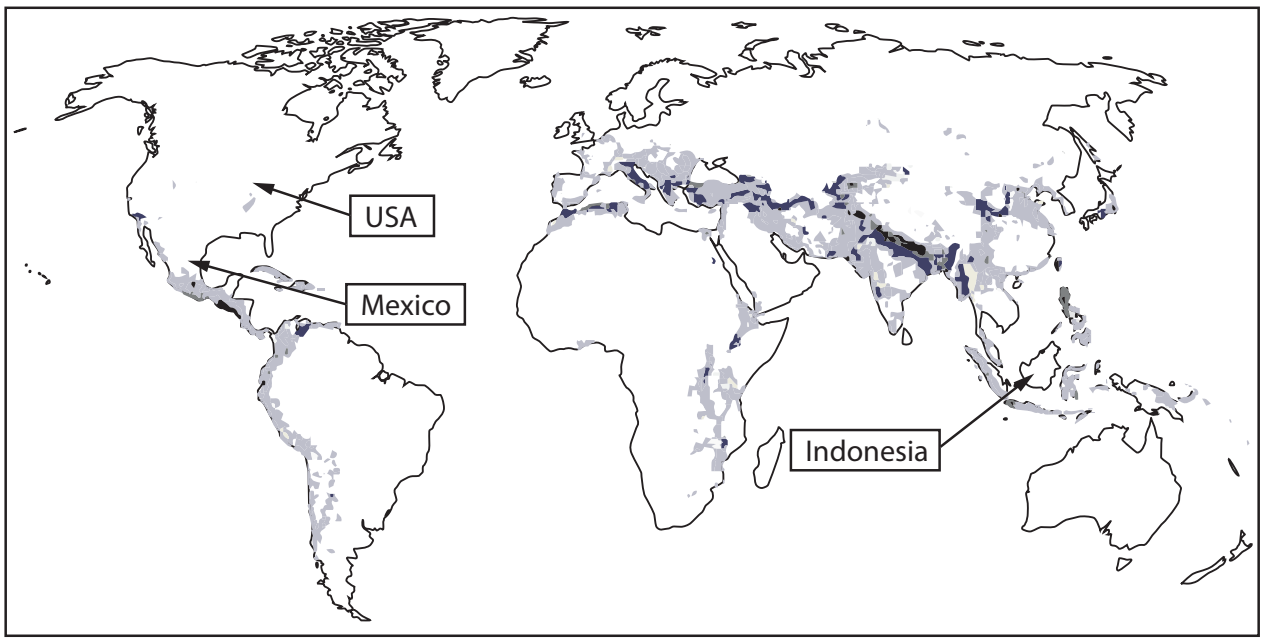


Figure 3b

Image of a tropical cyclone

Map shows the average annual number of people killed by seismic hazards 2010–2020



Key

Average annual number of fatalities

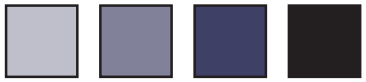


Figure 3c

Distribution of people killed by seismic hazard 2010–2020

Earthquake event	Mexico, Mexico City	United States, California	Indonesia, Sulawesi
Year	2017	2019	2021
Magnitude	7.1	6.4	6.2
GDP per capita (US$)	9,287	65,297	4,450
Deaths	370	1	105
Injuries	6,011	20	3,369
Doctors per 1,000 people	2.4	2.9	0.4
Corruption Perception Index Score (higher score is less perceived corruption)	31	67	37
Other details	Epicentre was near Atecingo, around 120 km from Mexico city.	Epicentre was in a remote region in the Mojave desert.	Epicentre was around 70 km from town of Bukittinggi in West Sumatra.

Figure 3d

Information on selected earthquake events 2017–2021

Pearson

Erratum Notice

4GE1_01
Pearson Edexcel International GCSE Geography
Paper 1: Physical Geography

Exam date: Monday 22nd May 2023

Instructions for the Examinations Officer

Please be advised that there is an error in the Pearson Edexcel International GCSE Geography, Paper 1: Physical Geography, Resource Booklet, page 12, Figure 3c.

The sequence in the resource booklet currently reads:

<5, 5-24, 24-50, 50>

It should read:

<5, 5-24, 24-50, **>50**

Before the start of the examination please ask students to amend their resource booklet.

Please accept our apologies for any confusion caused.

International Science Team

E71194A

If you answer Question 3, put a cross in the box ☒

3 Hazardous environments

(a) Identify the natural hazard.

(1)

- ☒ **A** car emission pollution
- ☒ **B** nuclear meltdown
- ☒ **C** oil slick from a ship
- ☒ **D** volcanic eruption

(b) (i) Identify a factor that affects development of tropical cyclones.

(1)

- ☒ **A** large areas of high pressure
- ☒ **B** warm sea surface temperatures
- ☒ **C** an undersea earthquake
- ☒ **D** pyroclastic flows

(ii) State **one** measure of tropical cyclone intensity.

(1)

.....

(iii) Explain how the Coriolis force affects tropical cyclones.

(2)

.....

.....

.....

.....

(c) Explain the formation of a constructive plate margin.

(3)

(d) Study Figure 3a in the Resource Booklet.

Suggest **two** short-term impacts of the earthquake shown.

(4)

1

2

(e) Study Figure 3b in the Resource Booklet.

Identify the feature shown at **X** on the diagram.

(1)

(f) Explain the long-term impacts of tropical cyclones.

(4)

(g) Study Figure 3c and Figure 3d in the Resource Booklet.

Analyse the reasons why people continue to live in areas prone to volcanic eruptions.

Refer to the resources in your answer.

(8)







Figure 3a

Earthquake impacts

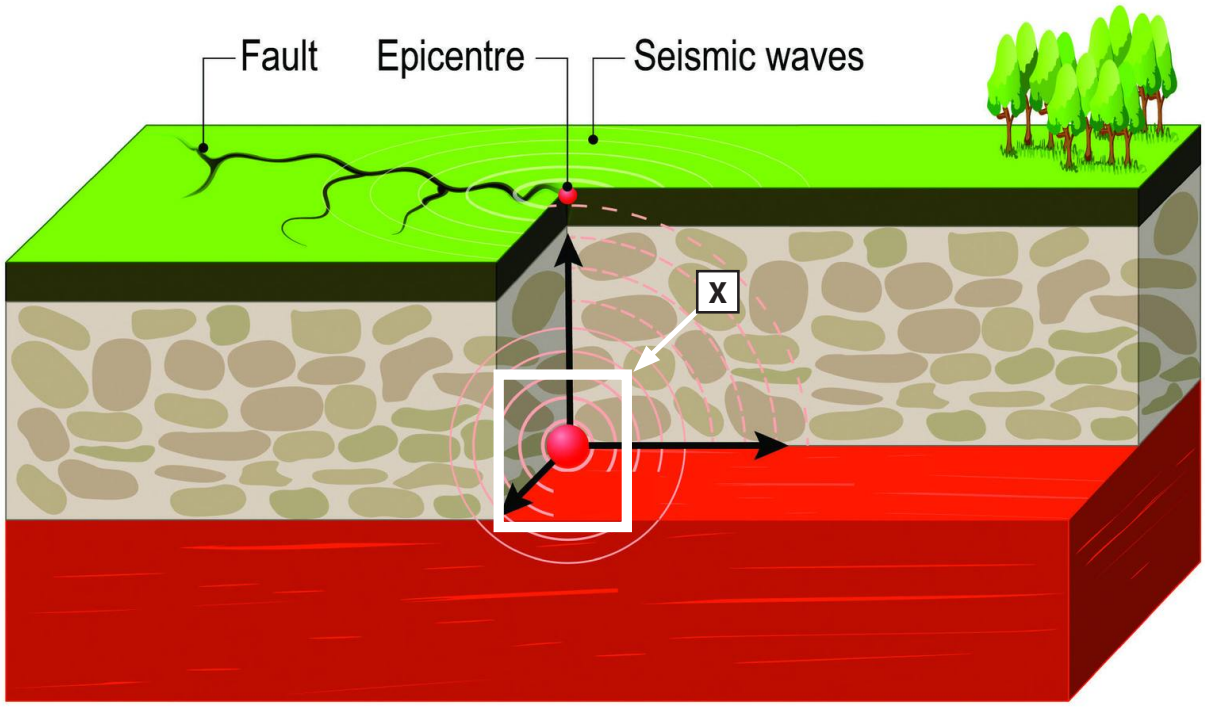


Figure 3b

Cross section of an earthquake zone



Farming with fertile soil in the shadow of a volcano in Indonesia.



Geothermal energy production from volcanic areas in Iceland.

Figure 3c

Areas prone to volcanic eruptions

Country/ state	Role	GDP per capita in 1000's US $ (2020)	Comment
New Zealand	Government scientist	42	We have excellent prediction and prevention techniques, which means we can manage the volcanic risk effectively.
Italy	Tourism guide	32	I live by Mt Etna as it provides a source of income for my family. I would have great difficulty getting a job in tourism elsewhere.
Papua New Guinea	Fisherman	3	We have no choice. We cannot afford to go anywhere else. If the volcano erupts that is our fate.

Figure 3d

Responses from a range of people when asked for comment on why they continued to live in areas prone to volcanic eruptions

If you answer Question 3, put a cross in the box ☒.

3 Hazardous environments

(a) Identify the feature of an earthquake.

(1)

- ☒ **A** cone
- ☒ **B** crater
- ☒ **C** epicentre
- ☒ **D** eye

(b) (i) Identify the best definition of Coriolis force.

(1)

- ☒ **A** The wall of cloud that surrounds the eye
- ☒ **B** The deflection of air due to the Earth's rotation
- ☒ **C** The force placed on the surface by the air above
- ☒ **D** The region of calm weather in the centre

(ii) State **one** impact of a volcanic eruption.

(1)

.....

(iii) Explain **one** way risk assessments can be used to manage earthquake hazards.

(2)

.....

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(c) Explain **one** way an earthquake can be measured.

(3)

(d) Study Figure 3a in the Resource Booklet.

Explain **two** characteristics of a tropical cyclone.

(4)

1

2

(e) Study Figure 3b in the Resource Booklet.

Identify the feature of the volcano labelled '**X**' in Figure 3b.

(1)

(f) Explain **one** physical factor and **one** social factor that increase a country's vulnerability to the impact of tropical cyclones.

(4)

Physical

Social

(g) Study Figure 3c in the Resource Booklet.

Analyse the influence plate margin type has on the scale of tectonic hazards.

Refer to the resource in your answer.

(8)

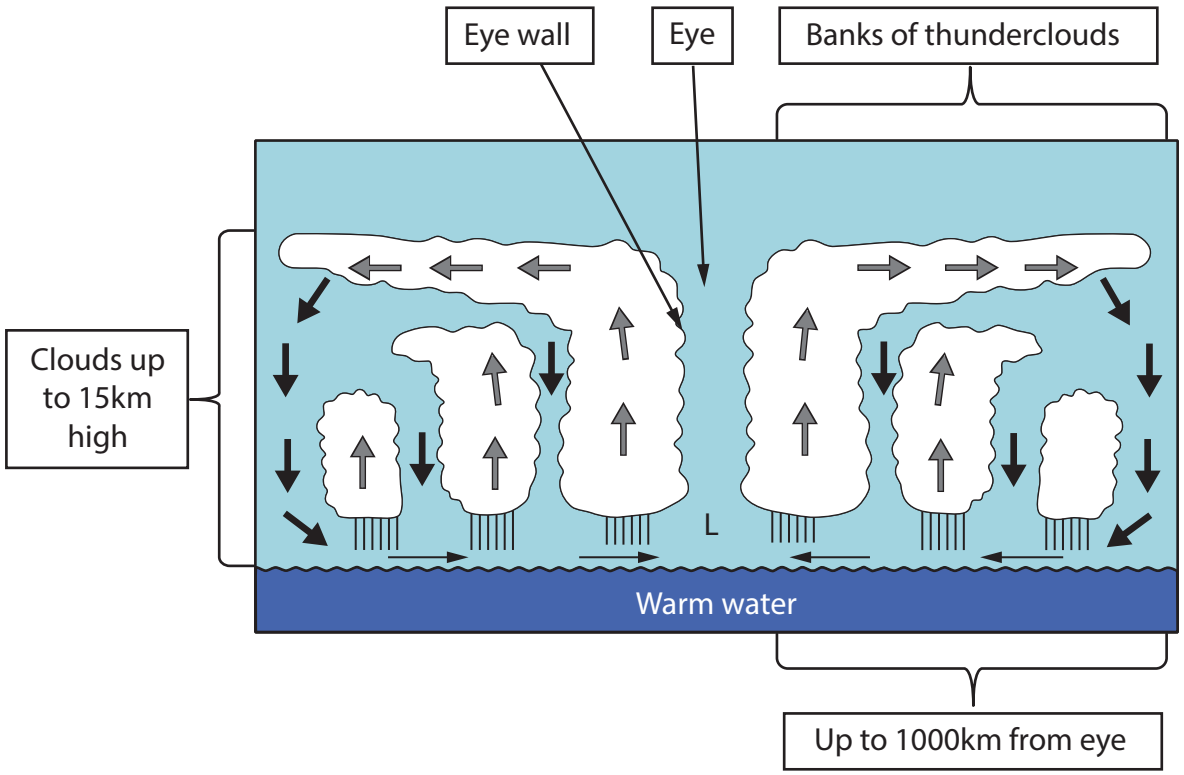


Figure 3a

The structure of tropical cyclones

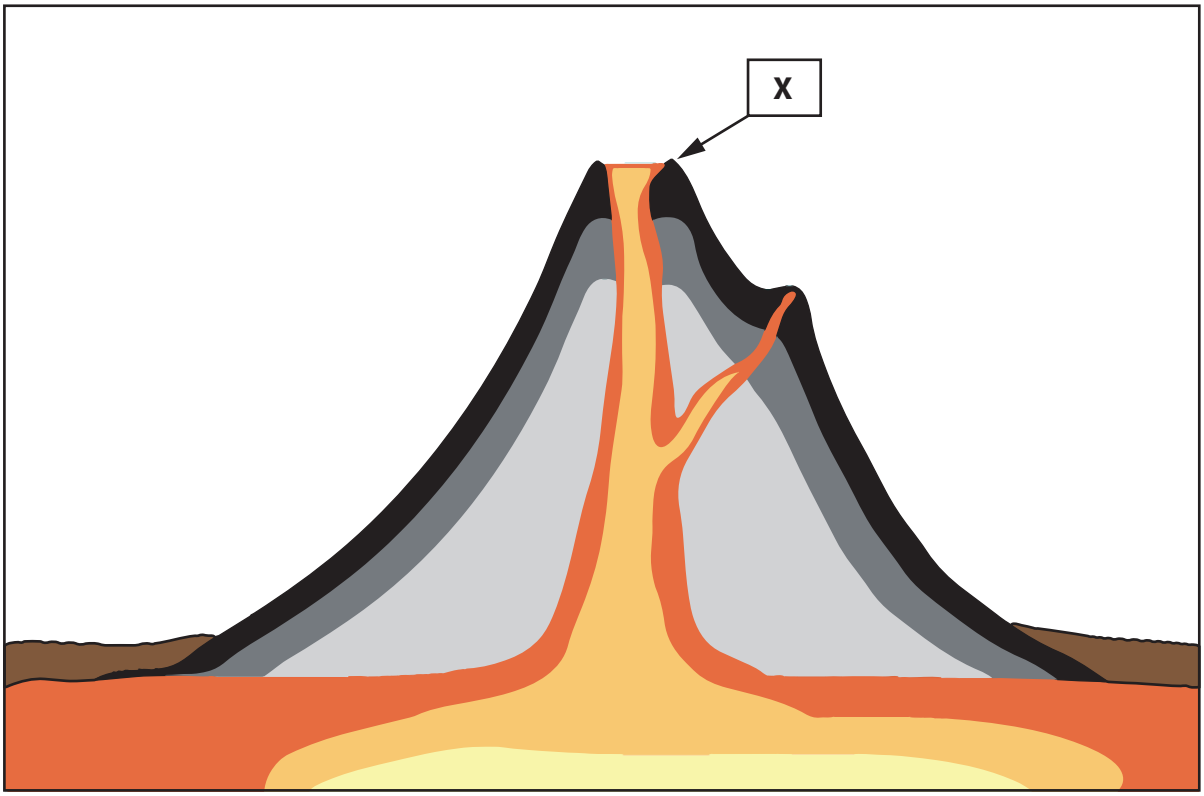


Figure 3b

Structure of a volcano

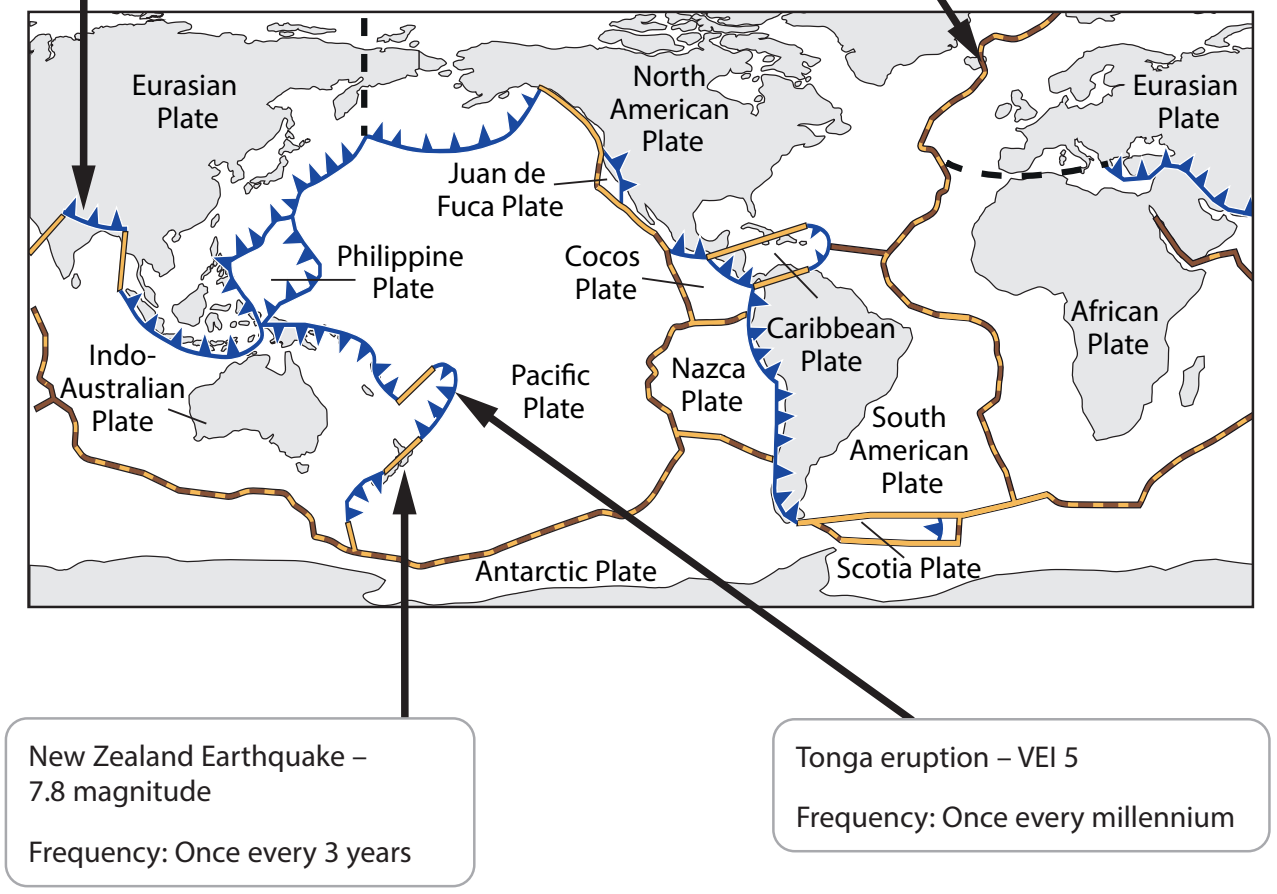


Figure 3c

Types of plate margins and scale of tectonic hazards

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Acknowledgements

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Figure 3c: https://www.nps.gov

If you answer Question 3, put a cross in the box ☒.

3 Hazardous environments

(a) Identify the plate boundary where volcanoes **do not** form.

(1)

- ☒ **A** conservative (transform)
- ☒ **B** constructive (divergent)
- ☒ **C** destructive (convergent)
- ☒ **D** hotspot

(b) (i) Identify the correct way to measure tropical cyclone intensity.

(1)

- ☒ **A** Mercalli scale
- ☒ **B** Moment magnitude scale
- ☒ **C** Richter scale
- ☒ **D** Saffir-Simpson scale

(ii) State **one** characteristic of a tropical cyclone.

(1)

.....

(iii) Explain **one** reason tropical cyclones lose their energy when they reach land.

(2)

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(c) Explain **two** reasons preparation for earthquakes may be more effective in some countries than others.

(4)

1 .....

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(d) Explain **one** physical factor that can make people more vulnerable to natural hazards.

(3)

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(e) Study Figure 3a in the Resource Booklet.

Identify the volcanic hazard labelled **X**.

(1)

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(f) Study Figure 3b in the Resource Booklet.

Suggest **two** reasons for the distribution of volcanoes.

(4)

1 .....

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2 .....

(g) Study Figure 3c in the Resource Booklet.

Analyse the impacts of the volcanic eruption on the environment.

You **must** refer to the resource in your answer.

(8)

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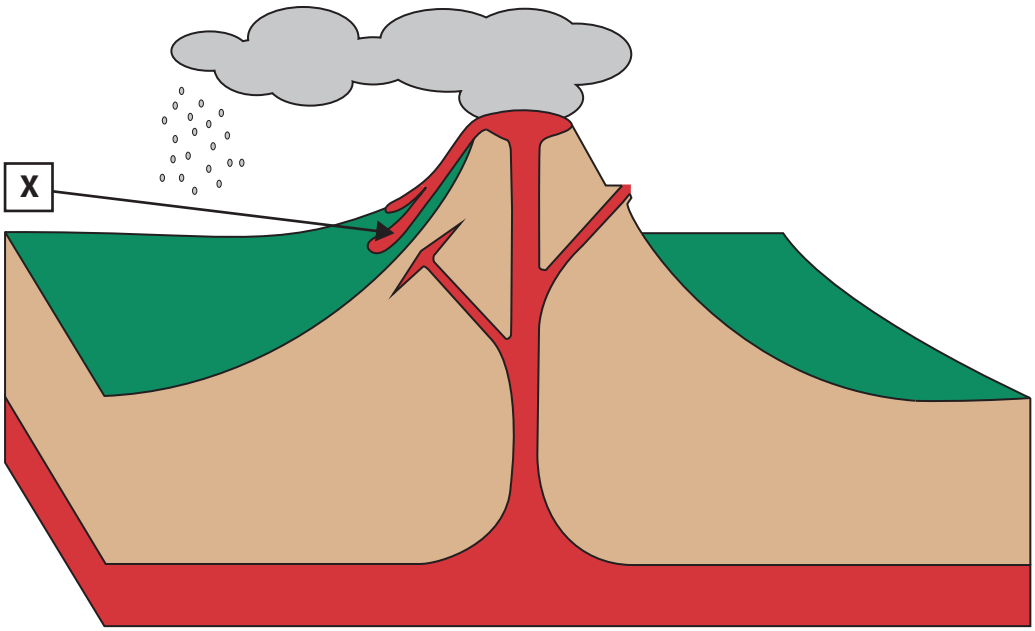
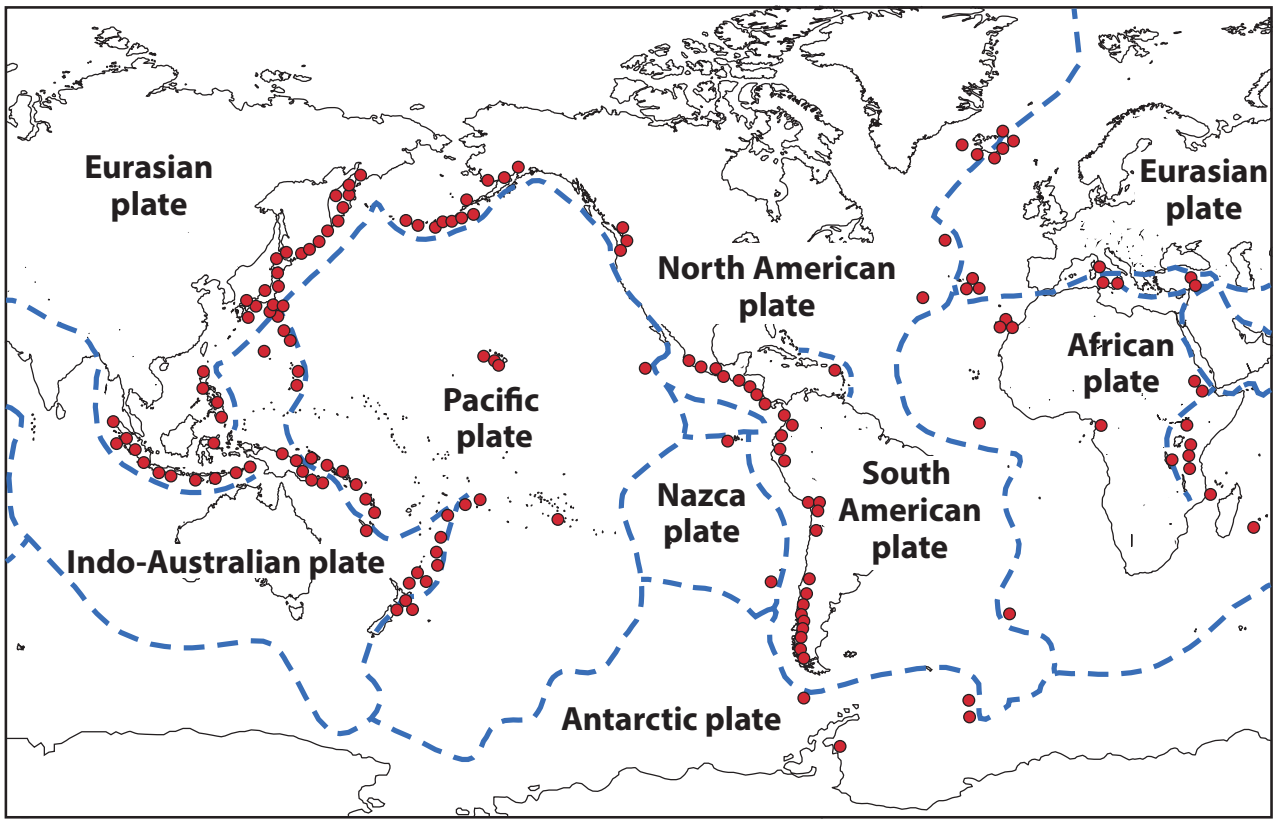


Figure 3a

Features of a volcanic eruption

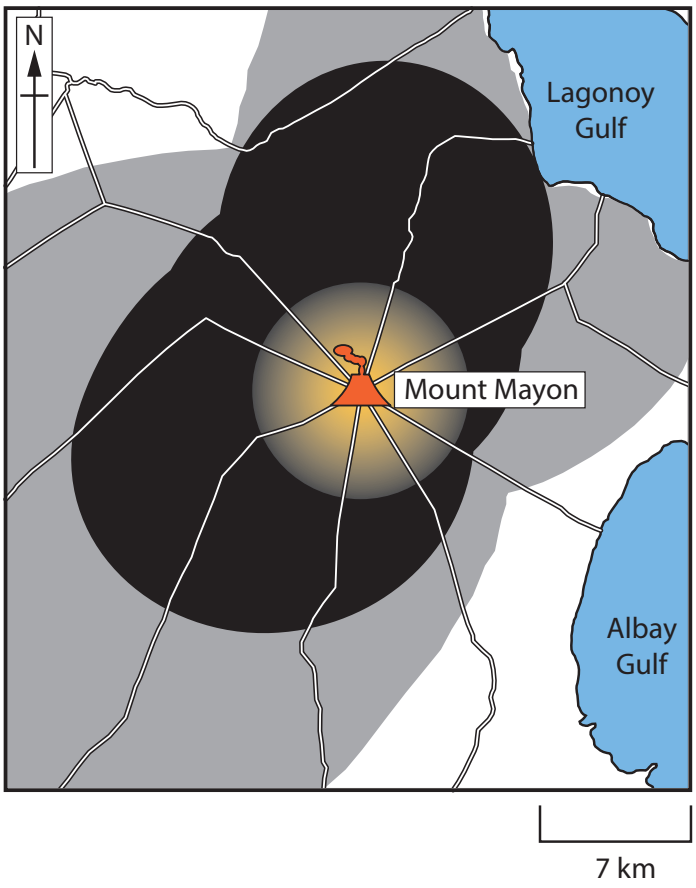


Key

- Volcano
- Plate boundaries

Figure 3b

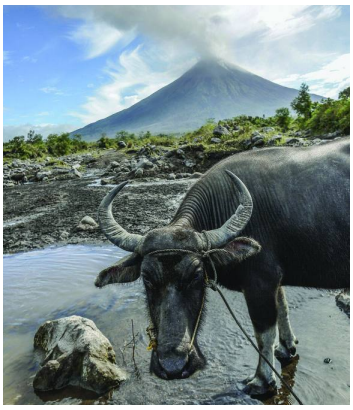
Global distribution of volcanoes



Area covered by ash after the Mount Mayon eruption, Philippines, January 2018

Key

- Highly prone to ash fall
- Moderately prone to ash fall
- Least prone to ash fall



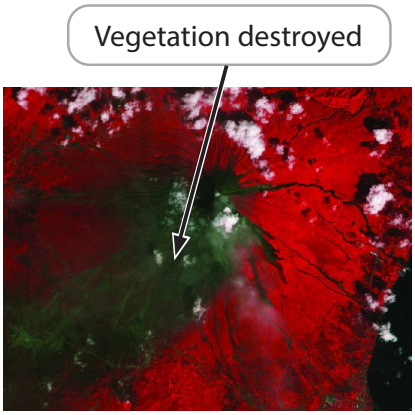
Water pollution at base of Mount Mayon

29 rivers around the volcano were silted with volcanic ash making the water unsafe to drink and irritating animal skin.



Farming at base of Mount Mayon

US$3.3 million of crops were destroyed affecting 9,800 farmers and covering 7,100 hectares.



Vegetation cover after eruption

(Red – vegetation cover / Green destroyed vegetation)

Lava flowed up to 3 km from the crater destroying large areas of vegetation in the National Park which has 239 vegetation species.

Figure 3c

Selected impacts from Mount Mayon eruption, Philippines, January 2018

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Figure 3c: https://www.esa.int/ESA_Multimedia/Images/2018/02/Mayon_lava

If you answer Question 3, put a cross in the box ☒.

3 Hazardous environments

(a) Identify **one** hazard associated with tropical cyclones.

(1)

- ☒ **A** faulting
- ☒ **B** ground shaking
- ☒ **C** liquefaction
- ☒ **D** strong winds

(b) (i) Identify **one** reason why volcanoes occur at hotspots.

(1)

- ☒ **A** forms a caldera with a ridge of higher land around it
- ☒ **B** hot plumes of magma break through crust away from plate boundaries
- ☒ **C** runny lava erupts at constructive plate boundaries
- ☒ **D** sticky lava erupts at destructive plate boundaries

(ii) State the name of **one** scale used to measure volcanic eruptions.

(1)

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(iii) Explain **one** reason volcanoes **do not** occur at conservative (transform) plate boundaries.

(2)

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(c) Explain **two** reasons short-term responses to earthquakes can be more effective in some countries than others.

(4)

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2 .....

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(d) Explain **one** reason people live in areas at risk of earthquakes.

(3)

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(e) Study Figure 3a in the Resource Booklet.

Identify the volcanic hazard labelled **X**.

(1)

.....

(f) Study Figure 3b in the Resource Booklet.

Suggest **two** reasons for the distribution of tropical cyclones.

(4)

1 .....

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2 .....

(g) Study Figure 3c in the Resource Booklet.

Analyse the impacts of tropical cyclones on people.

You **must** refer to the resource in your answer.

(8)

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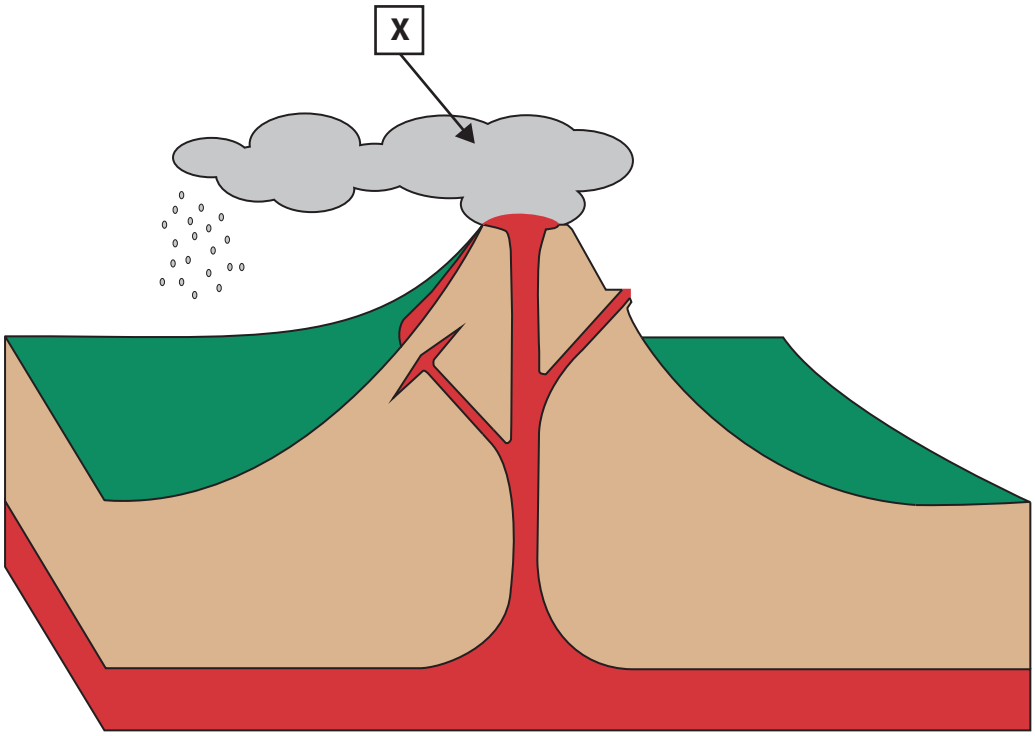


Figure 3a

Features of a volcanic eruption

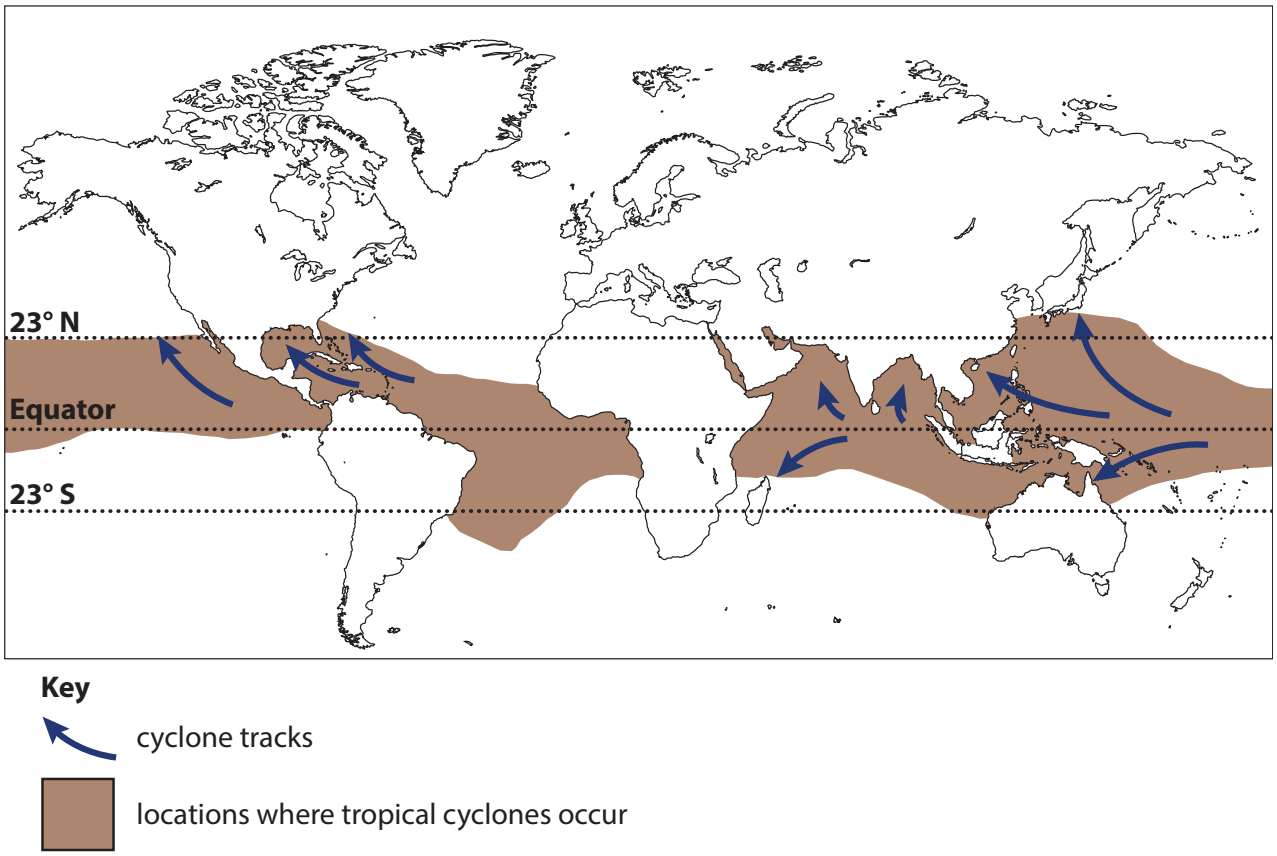
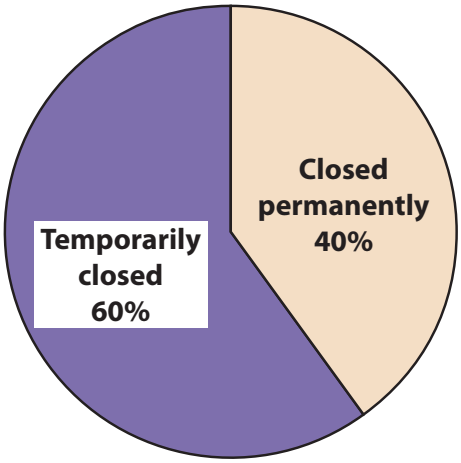


Figure 3b

Global distribution of tropical cyclones



Impact on businesses



Flooding after 30 rivers burst their banks due to 20 cm of rainfall in 24 hours. Coastal flooding from a 2 m storm surge.



25% of homes in Florida Keys were destroyed. 65% of the remaining homes were damaged.



Power cuts affected 73% of Florida residents. People had to queue for gas to power homes.

Figure 3c

Selected impacts from Hurricane Irma, Florida, 2017

3 Hazardous environments

(a) (i) Identify **one** feature of a volcano.

(1)

- ☒ **A** crater
- ☒ **B** epicentre
- ☒ **C** eye
- ☒ **D** focus

(ii) Identify **one** hazard associated with volcanic eruptions.

(1)

- ☒ **A** Coriolis force
- ☒ **B** pyroclastic flow
- ☒ **C** strong wind
- ☒ **D** wind shear

(iii) Explain **one** reason people live near volcanoes.

(2)

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(b) Define the term **earthquake risk assessment**.

(1)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** physical characteristics that make this volcanic region vulnerable.

You **must** refer to the resource in your answer.

(4)

1 .....

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2 .....

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(d) Study Figure 3b in the Resource Booklet.

Identify the latitude range in which tropical cyclones mainly occur.

(1)

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(e) Explain **one** impact tropical cyclones can have on people.

(3)

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(f) Explain why **ocean temperature** and **wind shear** are important factors in tropical cyclone formation.

(4)

ocean temperature

wind shear

(g) Study Figure 3c in the Resource Booklet.

Analyse the effectiveness of earthquake preparation strategies used to reduce risk.

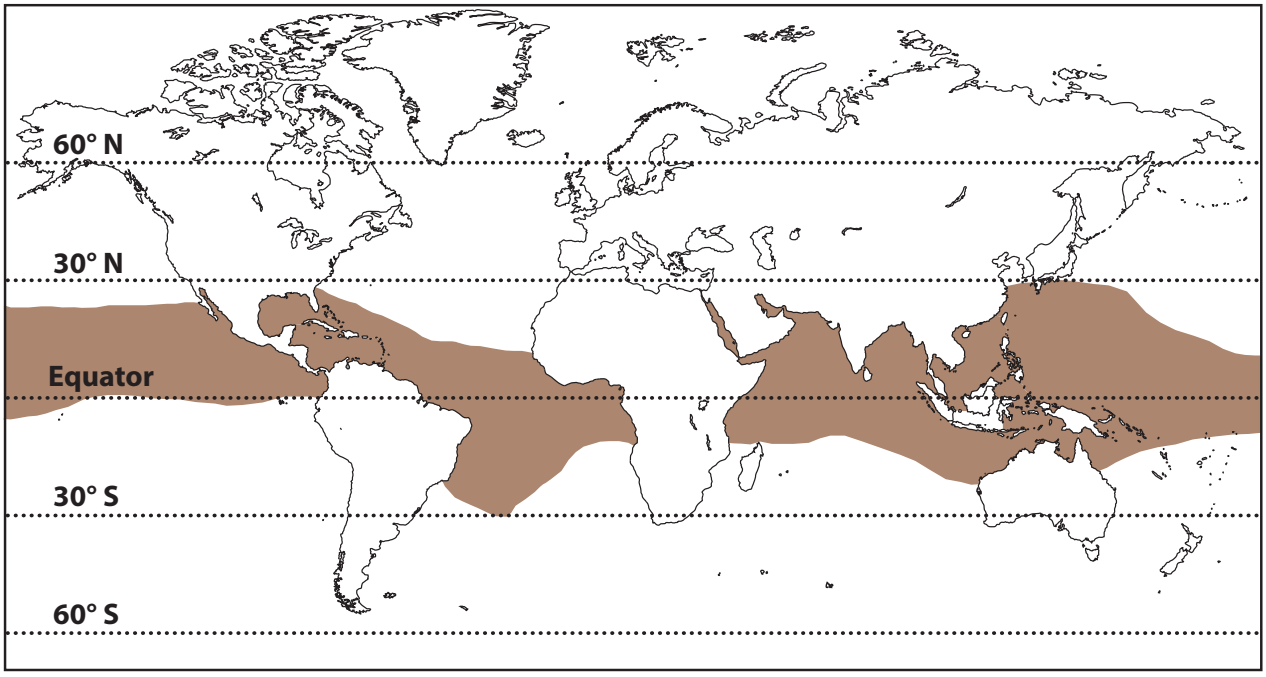
You **must** refer to the resource in your answer.

(8)



Figure 3a

A volcanic region in Japan



Key

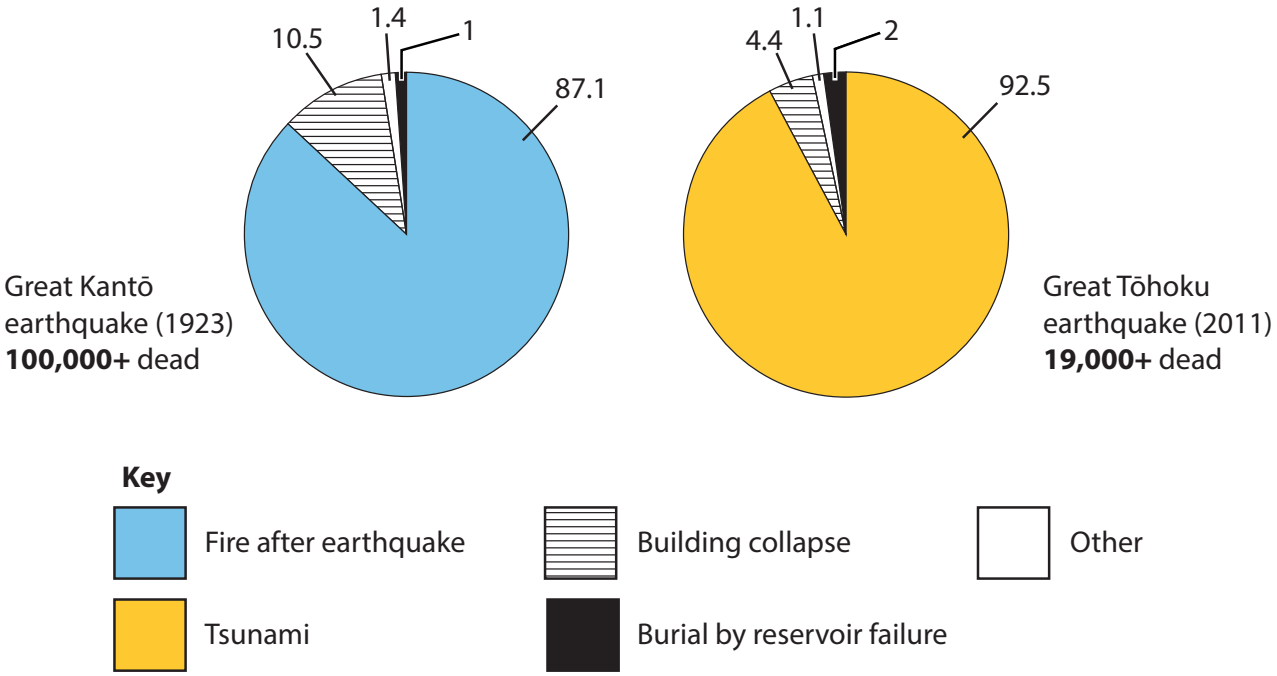
Lines of latitude

Locations where tropical cyclones occur

Figure 3b

Global distribution of tropical cyclones

Causes of death (shown as a percentage) from two major earthquakes in Japan, one in 1923 and one in 2011



Japanese Government leaflet distributed to every household

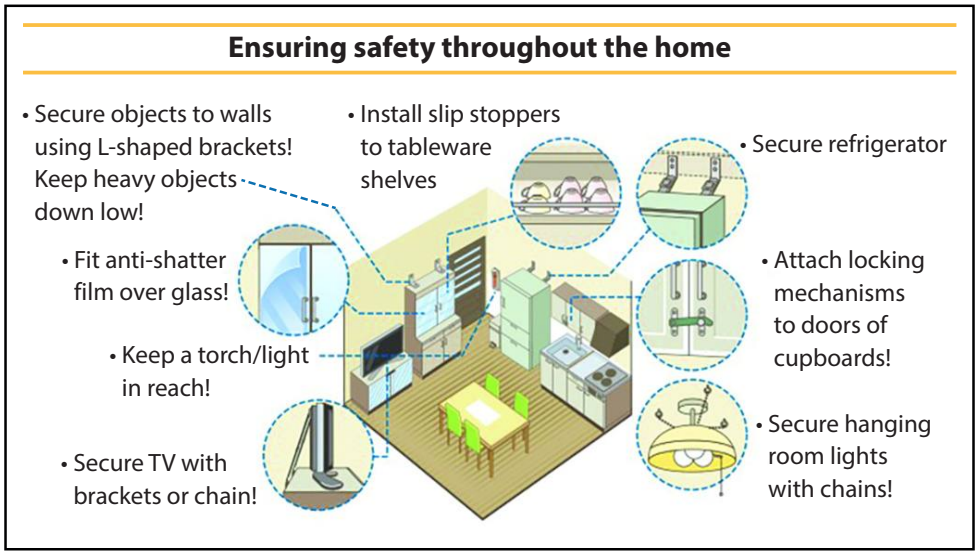


Figure 3c

Cause of deaths during earthquakes and extract from a household preparation leaflet, Japan

If you answer Question 3, put a cross in the box ☒.

3 Hazardous environments

(a) Identify the statement that best describes a destructive/convergent plate boundary.

(1)

- ☒ **A** tectonic plates moving away from each other
- ☒ **B** tectonic plates moving towards each other
- ☒ **C** tectonic plates sliding past each other
- ☒ **D** tectonic plates that never move

(b) (i) Identify a feature of a volcano.

(1)

- ☒ **A** epicentre
- ☒ **B** eye
- ☒ **C** focus
- ☒ **D** vent

(ii) State **one** hazard caused by a volcanic eruption.

(1)

.....

(iii) Explain **one** reason why volcanoes are formed at hotspots.

(2)

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(c) Study Figure 3a in the Resource Booklet.

Suggest **two** long-term impacts of the volcanic eruption on people.

You **must** refer to the resource in your answer.

(4)

1 .....

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2 .....

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(d) Study Figure 3b in the Resource Booklet.

Identify **one** labelled country at risk from this tropical cyclone.

(1)

.....

(e) Explain **two** causes of tropical cyclones.

(4)

1 .....

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2 .....

(f) Explain **one** reason why people live in areas at risk from tropical cyclones.

(3)

(g) Study Figure 3c in the Resource Booklet.

Analyse the impact physical factors have on a country's vulnerability to earthquakes.

You **must** refer to the resource in your answer.

(8)

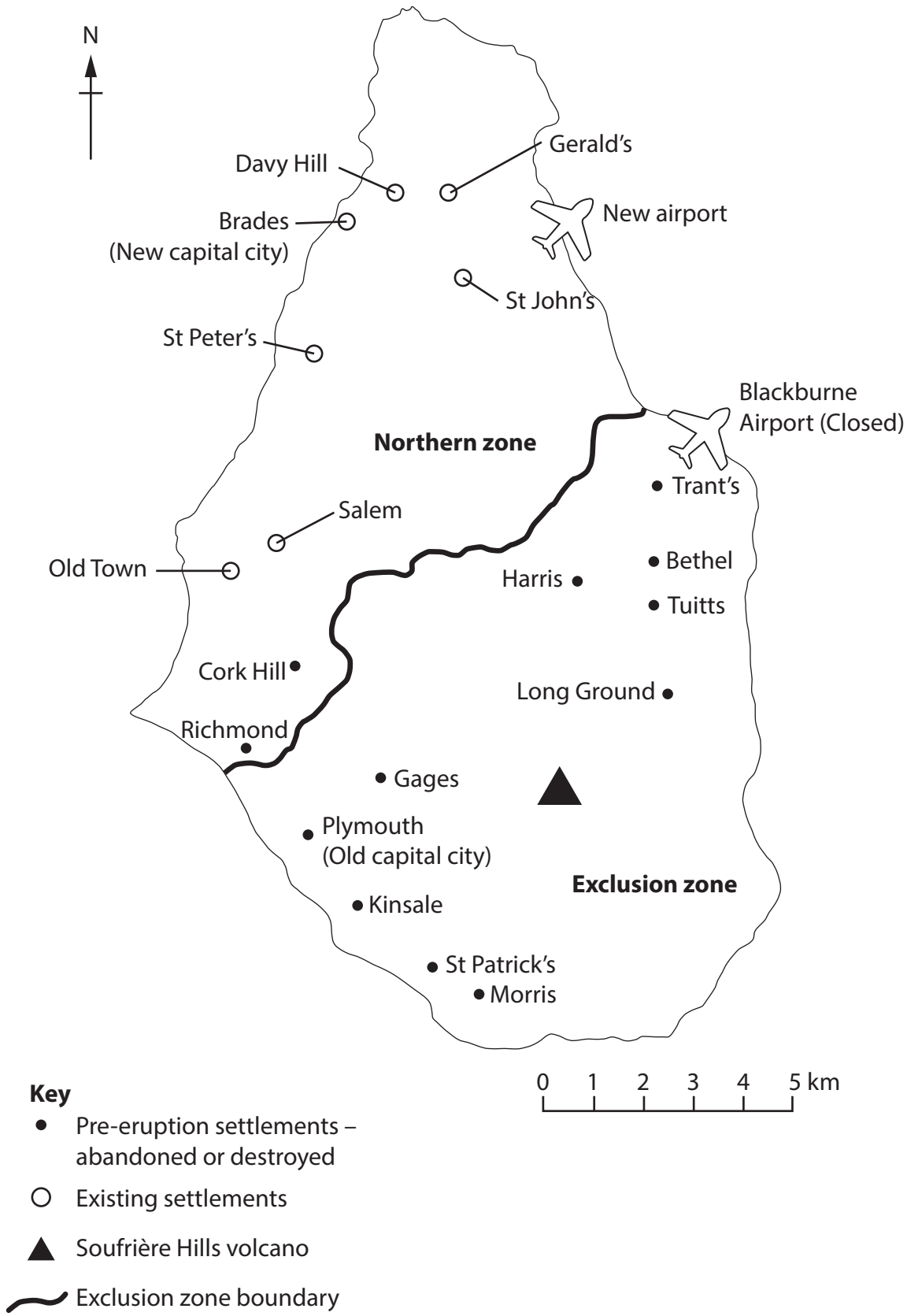
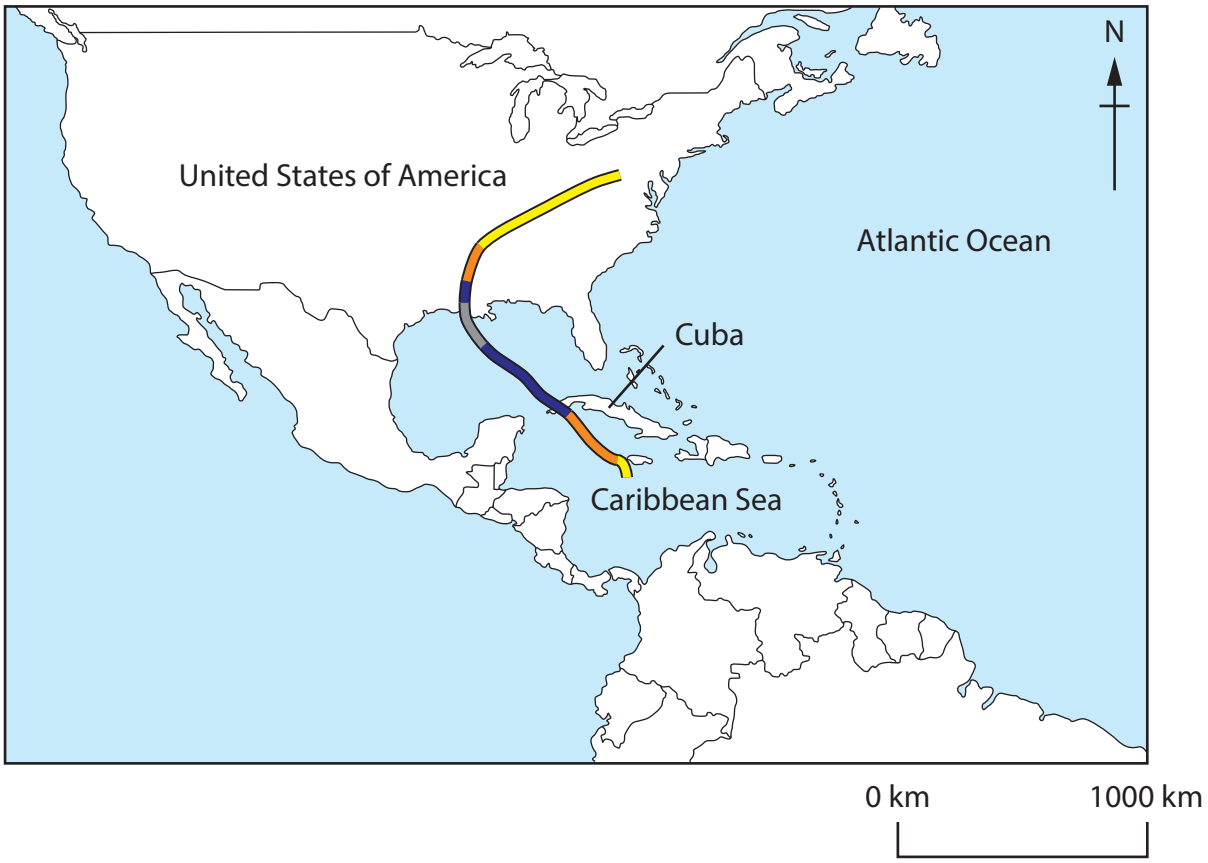


Figure 3a

Impacts of volcanic eruption, Montserrat

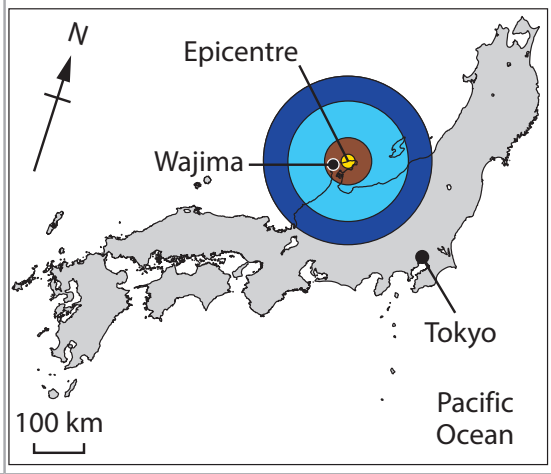
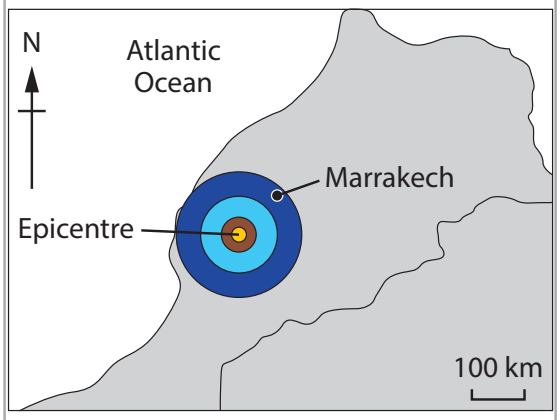


Key

- Depression
- Storm
- Hurricane
- Category 3 (or higher) hurricane

Figure 3b

Path of Hurricane (Tropical Cyclone) Ida, 2021

	Japan earthquake – 1 January 2024	Morocco earthquake – 8 September 2023
Map		
Plate boundary	Convergent (destructive)	Transform (conservative)
Magnitude	7.5	6.9
Focus depth	10 km	19 km
Epicentre	30 km northeast of Wajima city	72 km southwest of Marrakech city
Tsunami	Yes – 3.6 m	No
Time of day / year	Time: 16:10 Daily temperature range 0 to 6°C Public holiday	Time: 23:11 Daily temperature range 18 to 29°C
Impacts	• 500 deaths • 4,500 houses destroyed • 62,000 people displaced • Total cost of damage US$17.6 billion	• 3,000 deaths • 59,700 houses destroyed • 500,000 people displaced • Total cost of damage US$7 billion

Key: Earthquake strength

Moderate Strong Very strong Severe

Figure 3c

Characteristics of two earthquakes and selected impacts in contrasting countries

If you answer Question 3, put a cross in the box ☒.

3 Hazardous environments

(a) Identify **one** scale used to measure earthquake magnitude.

(1)

- ☒ **A** Beaufort scale
- ☒ **B** Okta scale
- ☒ **C** Richter scale
- ☒ **D** Saffir-Simpson scale

(b) (i) Identify which statement best describes the focus of an earthquake.

(1)

- ☒ **A** older and lighter tectonic crust
- ☒ **B** point inside the Earth's crust where the earthquake starts
- ☒ **C** point on the Earth's surface directly above where the earthquake starts
- ☒ **D** younger and denser tectonic crust

(ii) State **one** hazard caused by an earthquake.

(1)

.....

(iii) Explain **one** long-term impact earthquakes can have on the natural environment.

(2)

.....

.....

.....

.....

(c) Study Figure 3a in the Resource Booklet.

Suggest **two** strategies used in Salt Lake City to effectively manage earthquakes.

You **must** refer to the resource in your answer.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(d) Study Figure 3b in the Resource Booklet.

Identify the type of plate boundary shown.

(1)

.....

(e) Explain **two** characteristics of volcanoes found at different types of plate boundary.

(4)

1 .....

.....

.....

.....

2 .....

(f) Explain **one** reason people live in areas at risk from volcanic eruptions.

(3)

(g) Study Figure 3c in the Resource Booklet.

Analyse how physical factors can contribute to a country's vulnerability to tropical cyclones (typhoon).

You **must** refer to the resource in your answer.

(8)

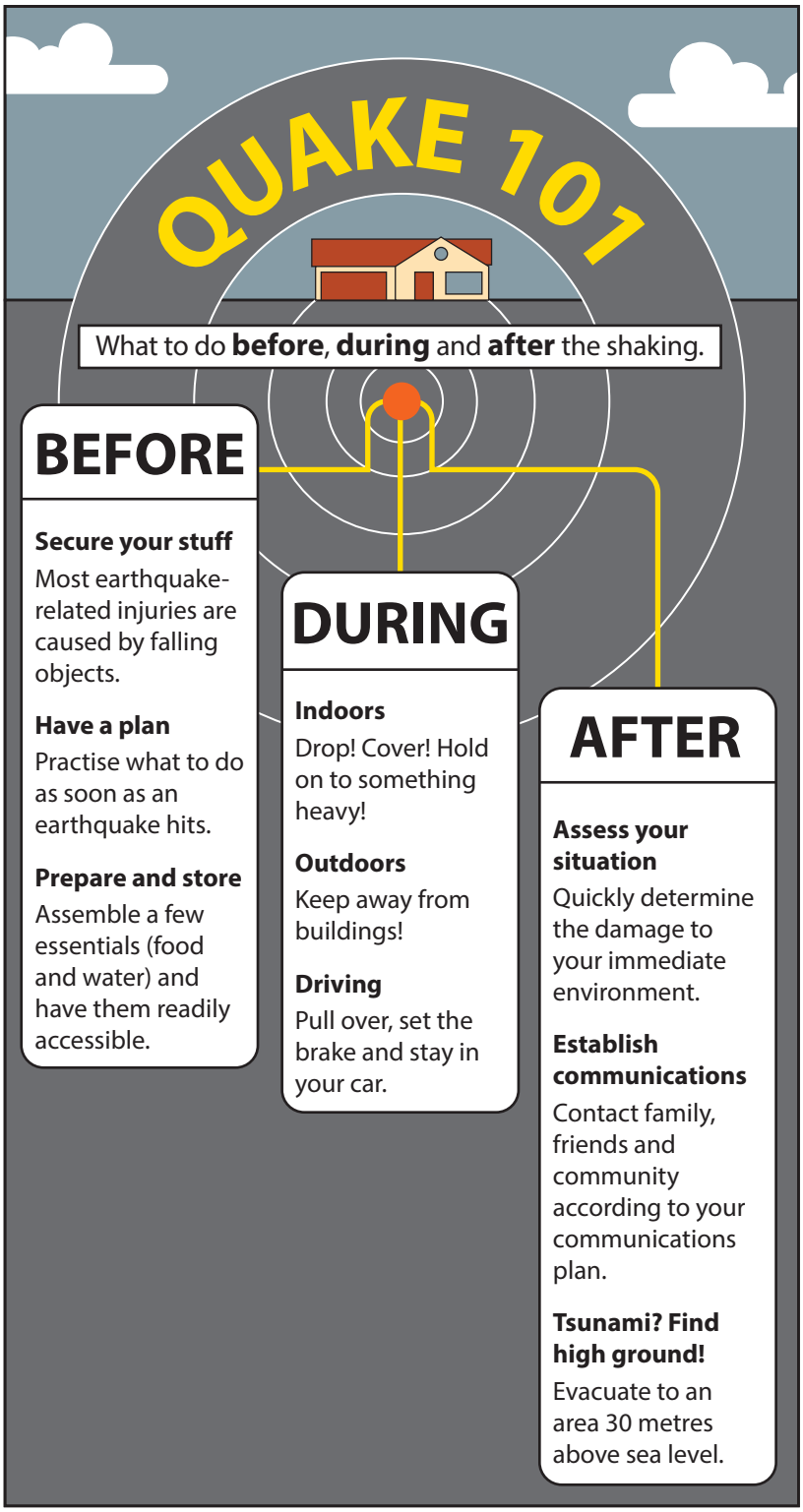


Figure 3a

Information for residents in Salt Lake City, USA

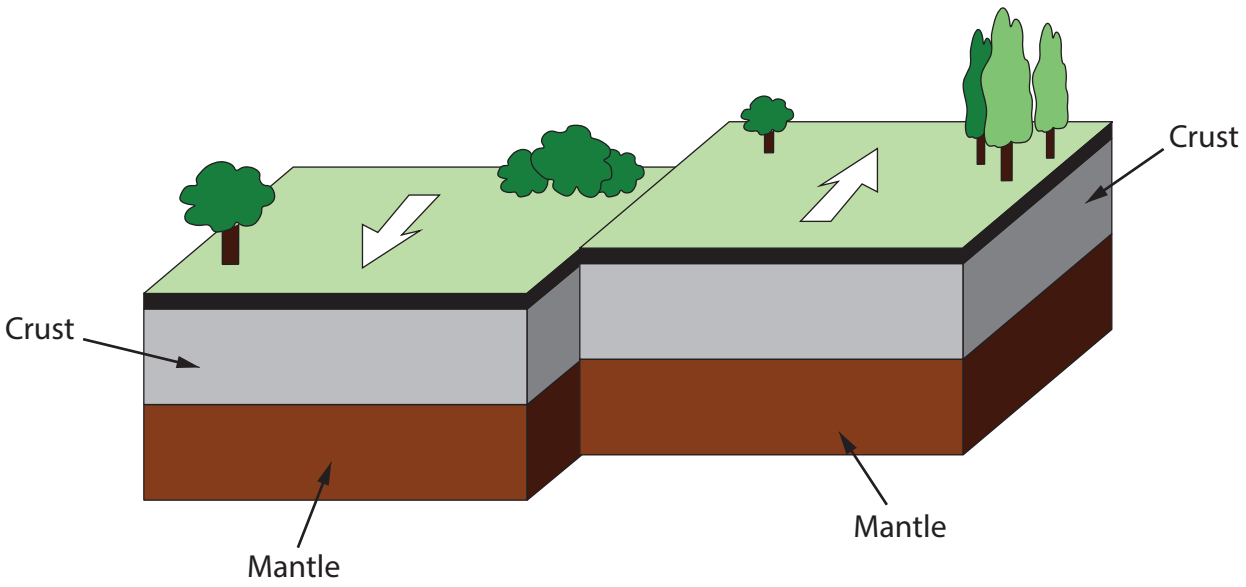
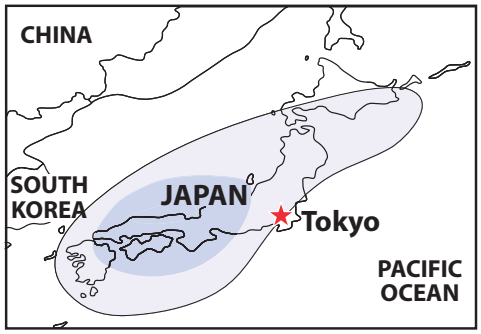
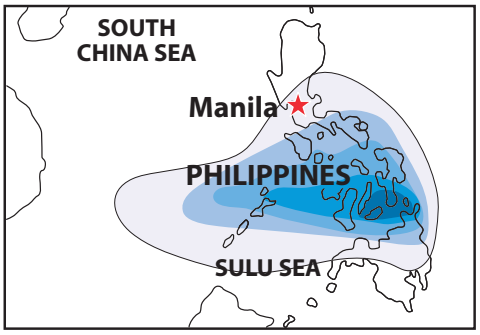


Figure 3b

Tectonic plate boundary

	Japan typhoon (cyclone) Nanmadol – September 2022	Philippines typhoon (cyclone) Rai – December 2021
Map		
Category	4	5
Storm diameter	926 km	833 km
Peak wind speed	249 km/h	272 km/h
Storm surge height	14 m	4 m
Precipitation	500 mm in 24 hours	150 mm in 24 hours
Landslide	Yes	Yes
Impacts	• 5 deaths • 190,000 experienced power cut • Total cost of damage US$1.2 billion	• 410 deaths • 3 million experienced power cut • Total cost of damage US$1.05 billion

Key: Wind speed (km/h)

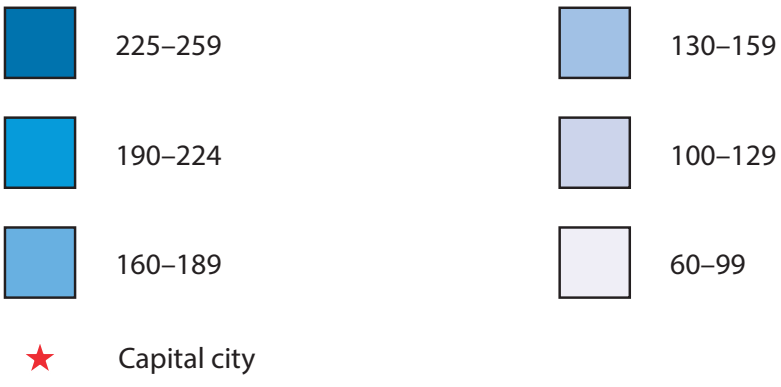


Figure 3c

Characteristics of tropical cyclones and selected impacts in two different countries

SUB-TOPIC

FIELDWORK: INVESTIGATING HAZARDOUS ENVIRONMENTS

16 questions in this booklet

If you answer Question 6 put a cross in the box ☒

6 Investigating Hazardous Environments.

A group of students have investigated the physical processes involved in an extreme weather event, by recording a weather diary.

The students used an anemometer to record wind speed every hour.

(a) (i) Identify the type of sampling method used.

(1)

☒	**A** systematic
☒	**B** random
☒	**C** stratified
☒	**D** opportunistic

(ii) State **one** disadvantage of using one of the sampling methods in the question above, a(i).

Sampling method .....

(1)

.....

.....

Study Figure 6a in the Resource Booklet. It shows sample data about wind speed.

(iii) Calculate the mean wind speed for the five samples.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mph

(iv) Using the data in Figure 6a (in the Resource Booklet), complete Figure 6b below for measurements 1 and 4.

(2)

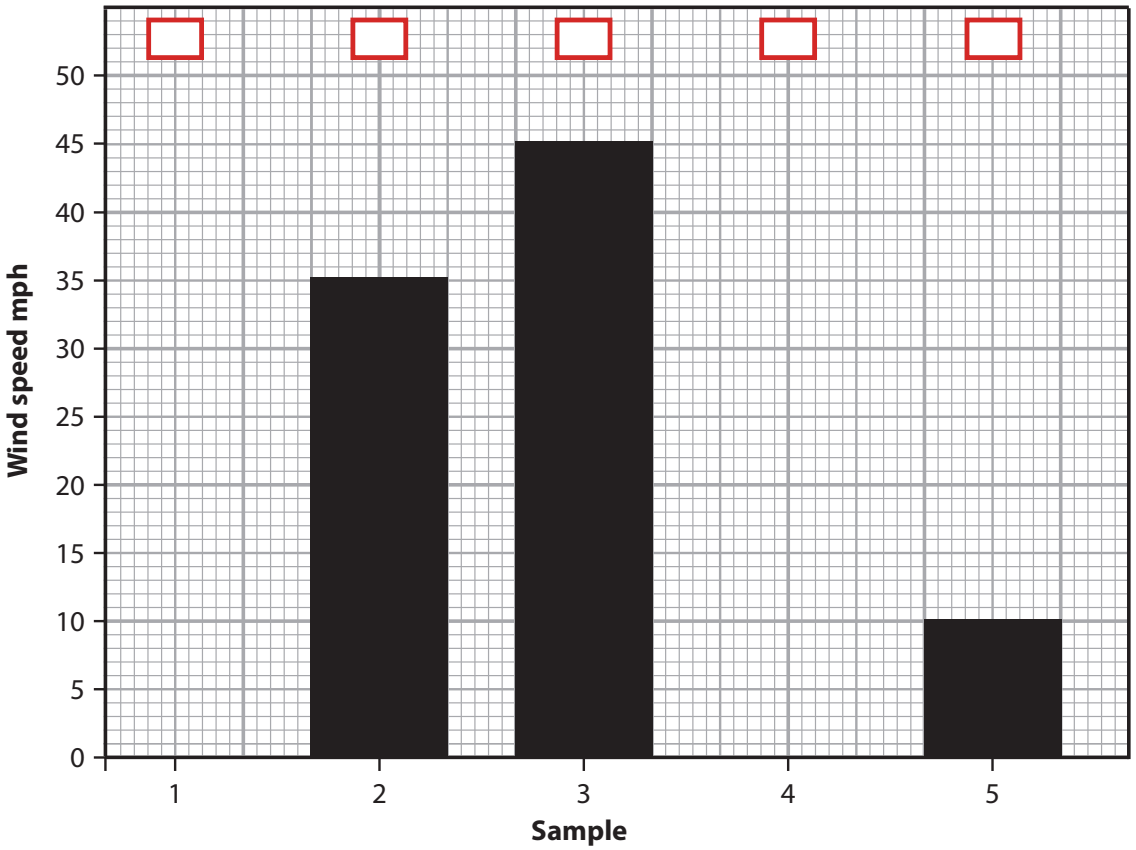


Figure 6b

Wind speed measurements

(v) Mark an x in the box on Figure 6b which represents the sample with the anomalous result.

(1)

(vi) Suggest **one** possible explanation for this anomaly.

(2)

.....

.....

.....

.....

(b) To extend the weather study, students were asked to use **one** other primary data method.

Explain **one** other primary data method.

(3)

You have studied hazardous environments for your geographical enquiry.

(c) Evaluate how successful your chosen data analysis methods were in answering your geographical enquiry question.

(8)

Enquiry question

Sample	Wind speed (mph)
1	50.1
2	35.1
3	45.1
4	40.0
5	10.0

Figure 6a

Hazardous environment data collected by a group of students

6 Investigating Hazardous Environments.

A group of students have investigated the physical processes involved in an extreme weather event, by recording a weather diary.

(a) (i) Identify **one** risk that the students may identify when undertaking a risk assessment for this investigation.

(1)

.....

.....

(ii) State **one** way that this risk could be managed.

(1)

.....

.....

Study Figure 6a in the Resource Booklet. It shows some sample data about wind speed recordings during a tropical storm.

(iii) Calculate the mean wind speed across the five samples.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mph

(iv) Complete Figure 6b below for sites 1 and 4 using the data in Figure 6a (in the Resource Booklet).

(2)

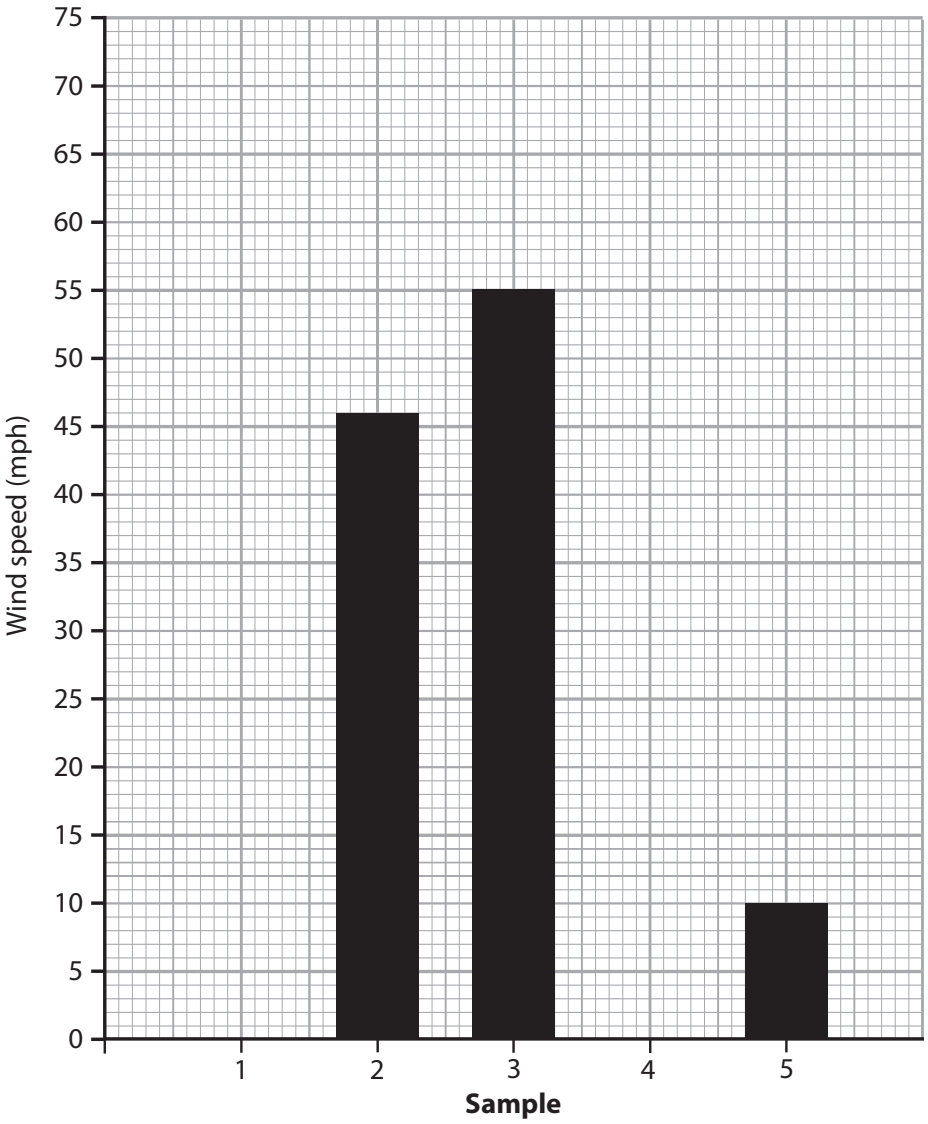


Figure 6b

Wind speed during a tropical storm

(v) Sample 5 shows an anomalous result.

Suggest **one** possible explanation for this.

(2)

(b) To extend the hazardous environment study, students were asked to use one additional quantitative and one qualitative technique.

Describe the **two** additional fieldwork techniques the students may have selected.

(4)

Quantitative

Qualitative

You have studied a hazardous environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data collection methods in responding to the purpose of the study.

(8)

Enquiry question

Sample	Average Wind speed (mph)
1	60.0
2	46.0
3	55.0
4	70.0
5	10.0

Figure 6a

Hazardous environment data collected by a group of students

If you answer Question 6 put a cross in the box ☒.

6 Investigating hazardous environments

A group of students has undertaken a geographical enquiry exploring temperature variation as part of their studies into extreme weather events.

(a) (i) State **one** secondary data source that the students might have used when undertaking this enquiry.

(1)

.....

.....

(ii) Identify **one** possible disadvantage of the secondary data source identified in 6(a)(i).

(1)

.....

.....

Study Figure 6a in the Resource Booklet. It shows temperature variations across five sites during an extreme weather event.

(iii) Using the data in Figure 6a calculate the mean highest temperature.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

.....°C

(iv) Use the data in Figure 6a to plot the data for Sites 3 and 4 on Figure 6b to complete the graph.

(2)

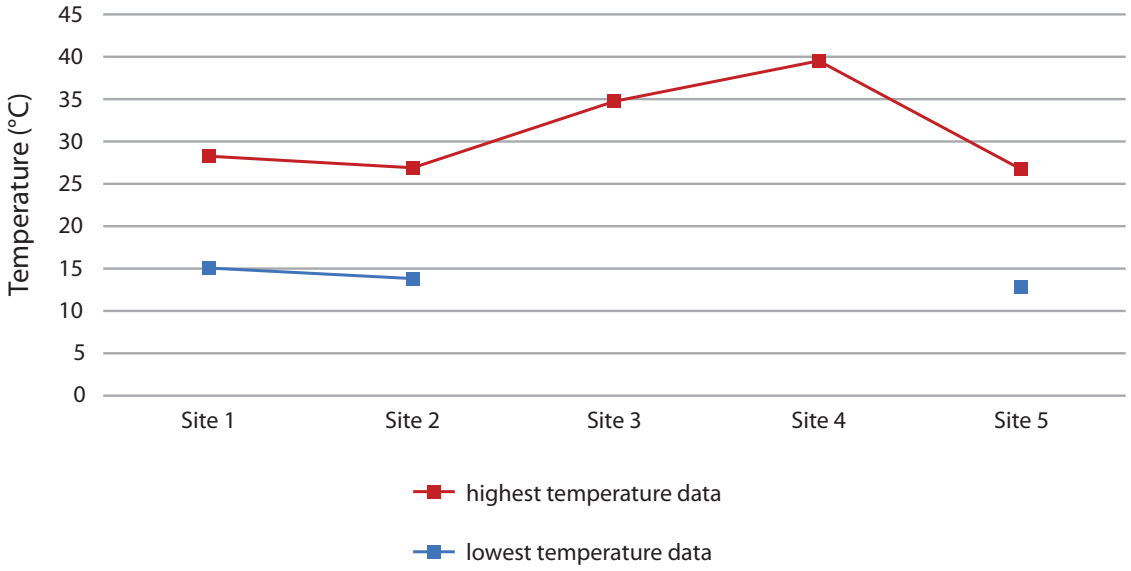


Figure 6b

Temperature variation during an extreme weather event

(v) The five sites (1–5) were selected randomly to take temperature readings.

Suggest **one** reason why an alternative sampling method might be chosen to select the sites.

(2)

Sampling method .....

.....

.....

.....

.....

(b) The students used annotated field sketches as part of their data collection to record information before and after the tropical cyclone.

Suggest **one** advantage and **one** disadvantage of this technique.

(4)

Advantage

Disadvantage

You have studied a hazardous environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data presentation methods you used.

(8)

Enquiry question

	Temperature data (°C)		
	Mean annual temperature	**Highest temperature at each site**	**Lowest temperature at each site**
Site 1	26.4	28.2	15.1
Site 2	24.3	27.1	14.6
Site 3	26.8	34.8	13.3
Site 4	27.1	39.5	7.2
Site 5	26.3	26.8	13.1
Mean temperature across all sites	26.2	?	12.7

Figure 6a

Hazardous environment data collected by a group of students

Figure 1a (Source: © Tahreer Photography/Getty Images)

Figure 1c (Source: © Crown Copyright)

Figure 2a (Source Image 1: © Ashish_wassup6730/Shuttershock, Source Image 2: https://www.flickr.com/people/geography_southwest/)

Figure 2b (Source: © Costa Rodrigues/Shuttershock)

Figure 2c (Adapted from: http://www.geol-amu.org/notes/be1a-3-8.htm)

Figue 3a (Source Image 1: © EQRoy/Shutterstock, Source Image 2: https://www.flickr.com/people/geography_southwest/)

Figure 3b (Source: © LukaKikina. Shutterstock/PAL)

Figure 3c (Source Image 1: © Johan Larson/Shutterstock, Source Image 2: Leonard Zhukovsky)

6 Investigating hazardous environments

A group of students has undertaken a geographical enquiry exploring temperature variation as part of their studies into extreme weather events.

(a) (i) State **one** risk that the students might identify when undertaking this enquiry.

(1)

.....

.....

(ii) State **one** way of managing the risk identified in 6(a)(i).

(1)

.....

.....

Study Figure 6a in the Resource Booklet. It shows temperature variations across five sites during an extreme weather event.

(iii) Using the data in Figure 6a calculate the mean lowest temperature.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... °C

(iv) Use the data in Figure 6a to plot the data for Sites 4 and 5 to complete the graph.

(2)

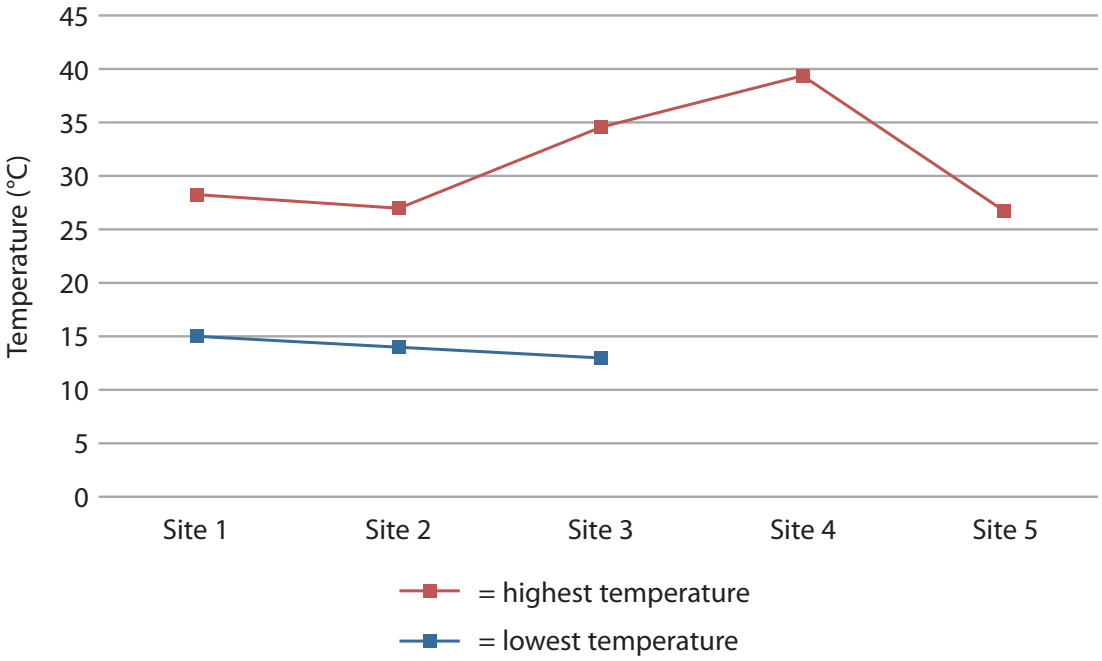


Figure 6b

Temperature variation during an extreme weather event

(v) The five sites (1–5) were selected randomly to take temperature readings.

Suggest **one** reason why the students chose random sampling for the selection of the five sites.

(2)

.....

.....

.....

.....

(b) The students used annotated field sketches as part of their data collection.

Suggest **one** advantage and **one** disadvantage of this technique.

(4)

Advantage

Disadvantage

You have studied a hazardous environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data analysis techniques you used.

(8)

Enquiry question

Temperature data (°C)			
	Average annual temperature	**Highest temperature during extreme weather event**	**Lowest temperature during extreme weather event**
Site 1	26.4	28.2	15.1
Site 2	24.3	27.1	14.4
Site 3	26.8	34.8	13.7
Site 4	27.1	39.5	7.5
Site 5	26.3	26.8	13.6
Mean across sites	26.18	31.28	?

Figure 6a

Temperature data collected by a group of students during an extreme weather event

Figure 1a sourced from: © milena moiola/Alamy Stock Photo
Figure 1b sourced from: © Sarah Ann Loreth/Aurora Photos/Getty Images
Figure 1c sourced from: International River Network © Eureka Cartography, Berkeley, CA
Figure 2a sourced from: © GagliardiPhotography/Shutterstock
Figure 2b sourced from: © Fotimageon/Shutterstock
Figure 2c sourced from: © astudio/Shutterstock
Figure 3a sourced from: © Butcherboy/Shutterstock
Figure 3b sourced from: © Harvepino/Shutterstock

6 (a) (i) Identify the correct definition of systematic sampling.

(1)

☒	**A** Collecting rainfall data at random sites in a town.
☒	**B** Collecting rainfall data every 1km away from the town centre.
☒	**C** Collecting rainfall data from two different towns.
☒	**D** Collecting rainfall data from three sites in a town.

(ii) Name **one** piece of equipment you would use to measure rainfall.

(1)

.....

(iii) Describe **one** health and safety risk it is important to be aware of when carrying out fieldwork related to hazardous environments.

(2)

.....

.....

.....

.....

(b) Study Figure 6 in the Resource Booklet. It shows information about some design, some data collection methods used, data presentation and a conclusion.

> The aim of the student's investigation was to examine change in weather patterns using a weather diary.

Evaluate how far the design and the data collection methods provided reliable evidence for the student's conclusions.

(8)

.....

.....

.....

.....

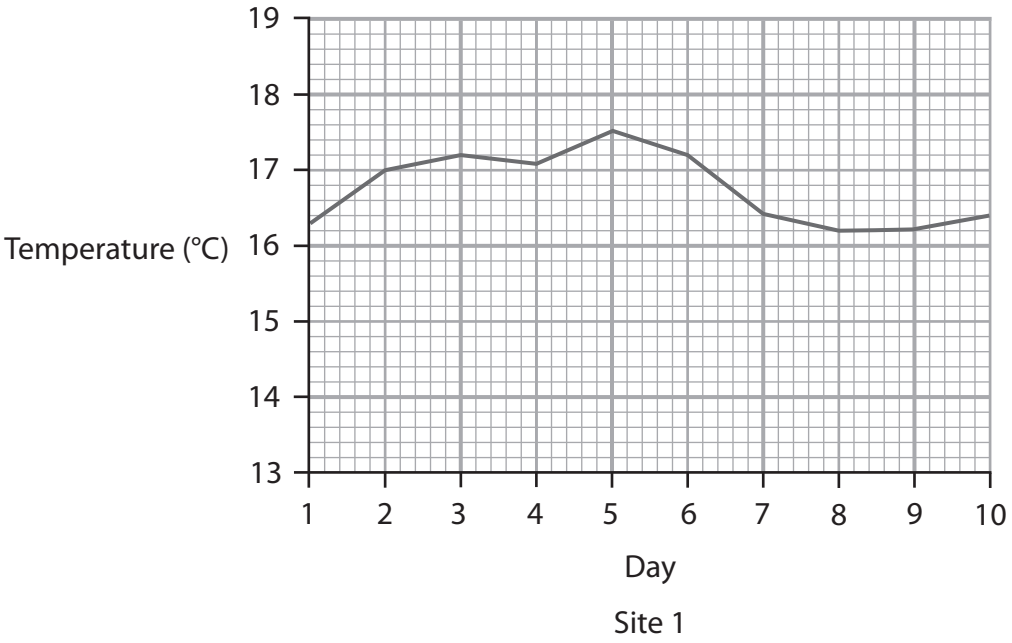
.....

At two different sites chosen at random on a map, data collected for a weather diary, including:

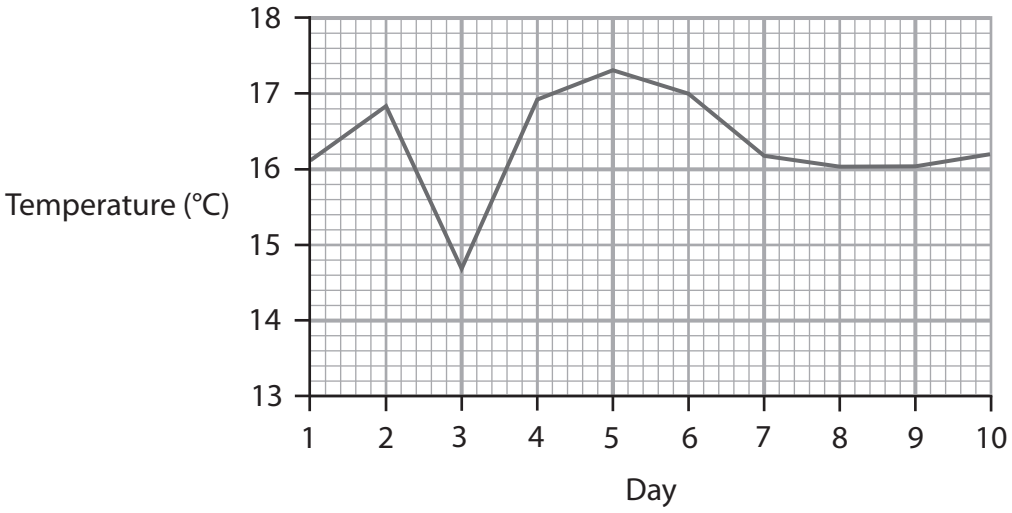
- temperature
- humidity
- rainfall

Figure 6a

Extract from data collection methods



Site 1



Site 2

	Conclusions
1	I found that the weather characteristics and changes in the weather were similar at both sites.
2	Changes in humidity were often linked to temperature and amount of rainfall.
3	There was little difference between the average temperatures of both sites.

Figure 6b

An extract from the student's data presentation and conclusion

6 (a) (i) Identify a suitable piece of equipment to measure wind speed.

(1)

☒	**A** Anemometer
☒	**B** Quadrat
☒	**C** Clinometer
☒	**D** Stopwatch

(ii) Name **one** type of sampling method.

(1)

(iii) Describe **one** way GIS might be used for fieldwork in a hazardous environment.

(2)

(b) Study Figure 6 in the Resource Booklet. It shows some information about methods used, data collected and a conclusion.

> The aim of the student's investigation was to examine change in local weather conditions.

Evaluate how far the student's data presentation methods and analysis helped the student to make their conclusions.

(8)

If you answer Question 6 put a cross in the box ☒.

6 Investigating hazardous environments

A group of students have undertaken an enquiry that explores relationships between local weather characteristics.

(a) Study Figure 6a in the Resource Booklet.

(i) Identify **one** type of primary data used by the students.

(1)

- ☒ **A** local weather map
- ☒ **B** field sketches
- ☒ **C** a local weather diary from last year
- ☒ **D** newspaper articles

(ii) Name **one** piece of equipment the students could have used in their enquiry.

(1)

.....

(b) Study Figure 6b which shows some data on wind speed at four sites where data was collected.

(i) Calculate the mean wind speed collected at Site 2.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mph

(ii) State **one** type of sampling students could have used to choose their data collection sites.

(1)

(iii) Suggest **one** reason why the data for Site 1 may not be reliable.

(2)

(c) (i) Complete Figure 6d below using data highlighted in Figure 6c in the Resource Booklet.

(2)

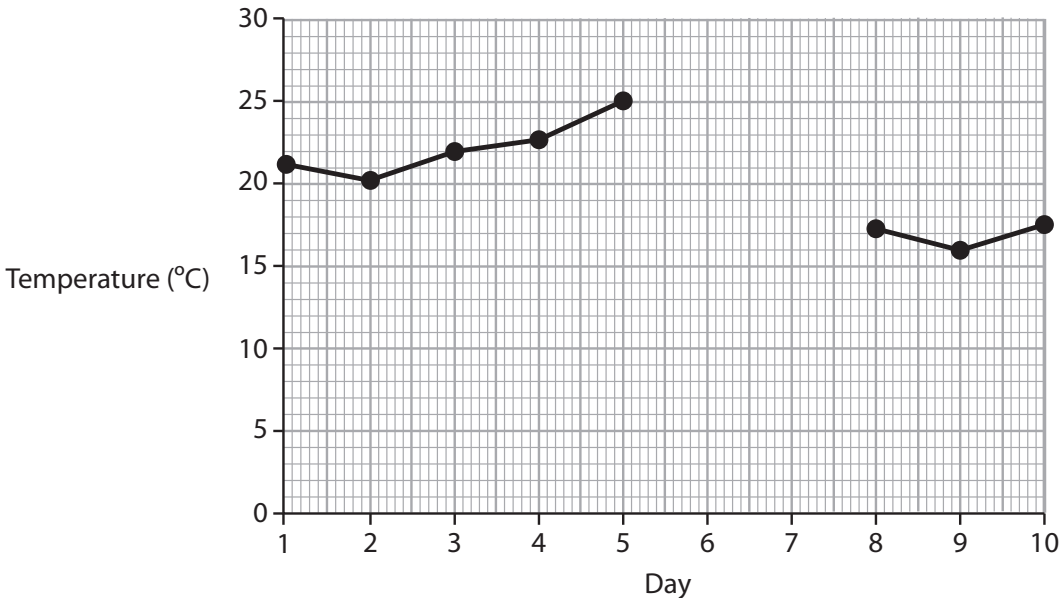


Figure 6d

Daily temperature

(ii) Explain **one** advantage of using a line graph to present results.

(3)

Data/information used by the students:

- Local weather map
- Newspaper articles
- Local weather diary from last year
- Field sketches
- Measurements of: rainfall, humidity and wind speed

Figure 6a

Selected types of data/information used by the students

	Site 1	Site 2	Site 3	Site 4
Reading 1	20	8	12	16
Reading 2	21	6	12	16
Reading 3	20	7	11	16
Reading 4	12	8	10	17
Mean wind speed	18	**?**	11	16
Range in wind speed	8	2	2	1

Figure 6b

Data collected on wind speed (mph)

Day	Temperature (°C)
1	21.2
2	20.3
3	22.0
4	22.6
5	25.0
6	**18.0**
7	**16.0**
8	17.2
9	16.0
10	17.6

Figure 6c

Data collected on daily temperature

Acknowledgments:
Pearson Education Ltd. gratefully acknowledges all following sources used in preparation of this paper:
Figure 2a adapted from: https://www.mdpi.com/2077-1312/8/3/154/htm
Figure 2c adapted from: https://oceanservice.noaa.gov/facts/coral-pollution.html
Figure 3b adapted from: © Manish Bansal

If you answer Question 6 put a cross in the box ☒.

6 Investigating hazardous environments

A group of students have undertaken an enquiry that explores local views on the importance of preparing for tropical cyclones at two sites.

(a) Study Figure 6a in the Resource Booklet.

(i) Identify **one** type of quantitative data used by the students.

(1)

☒ **A** annotated photographs

☒ **B** newspaper articles

☒ **C** amount of rainfall

☒ **D** interviews with local people

(ii) State **one** way maps could be used to support the enquiry.

(1)

.....

.....

(b) Study Figure 6b which shows some data about rainfall over 5 days during a tropical cyclone event.

(i) Calculate the mean rainfall.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mm

(ii) State **one** piece of equipment that could be used to measure rainfall.

(1)

.....

(c) (i) Complete Figure 6d below, using data highlighted in Figure 6c in the Resource Booklet.

(2)

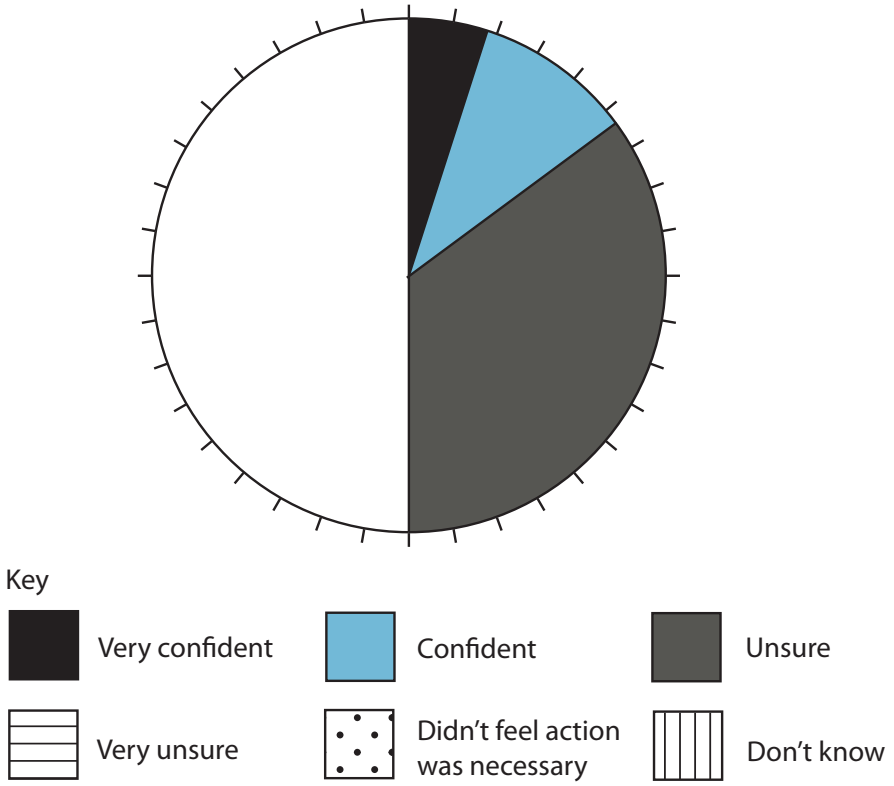


Figure 6d

Pie chart showing views on preparation for tropical cyclones

(ii) Identify **two** ways the students could have improved the reliability of the data collected.

(2)

1 .....

.....

2 .....

.....

(d) Explain **one other** fieldwork technique the students could have used to explore weather characteristics.

(3)

- Annotated photographs
- Newspaper articles
- Amount of rainfall
- Interviews with local people
- Data on wind speeds from live news feed
- Data on local views from a newspaper

Figure 6a

Selected data collection methods

Rainfall (mm)	Day
22	1
12	2
33	3
16	4
8	5

Figure 6b

Daily rainfall collected

Question: How confident do you feel about knowing how to respond in the event of a tropical cyclone?	
Response	**Percentage (%)**
Very confident	5
Confident	10
Unsure	35
Very unsure	25
Didn't feel action was necessary	15
Don't know	10

Figure 6c

Results from a questionnaire of local residents on preparation for a tropical cyclone event

Acknowledgements
Pearson Education Ltd. gratefully acknowledges all following sources used in preparation of this paper:
Figure 1a https://thewatercycle7.weebly.com/ or https://slideplayer.com/slide/9104886/
Figure 1b © Zoonar GmbH/Alamy Stock Photo
Figure 2c image 1 © Stuart Forster Europe/Alamy Stock Photo
Figure 2c image 2 © Ludmila Smite/Alamy Stock Photo
Figure 3a © National Oceanic and Atmospheric Administration - U.S. Department of Commerce
Figure 3b: © Tommy E Trenchard/Alamy Stock Photo
Figure 3c: image 1 © The Smithsonian Institution's Global Volcanism Program
Figure 3c: image 2 © NASA

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

You have carried out a geographical enquiry as part of your work on hazardous environments.

Title of your geographical enquiry

.....

.....

(a) Describe **one** way you managed a risk that you identified during your enquiry.

(2)

.....

.....

.....

.....

(b) Explain **one** way you decided on the sites for your data collection.

(3)

.....

.....

.....

.....

.....

(c) Describe **two** types of data collection method you used during your enquiry.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(d) Explain **one** technique you used to analyse your data.

(3)

.....

.....

.....

.....

.....

(e) Study Figure 6a and Figure 6b in the Resource Booklet. They show some information about data presentation from a student's enquiry.

> The aim of the student's enquiry was to investigate changes in weather features. The student made field sketches of the data collection sites, and collected data on wind speed, temperature and rainfall.

Evaluate the effectiveness of the data presentation techniques used by the student.

(8)

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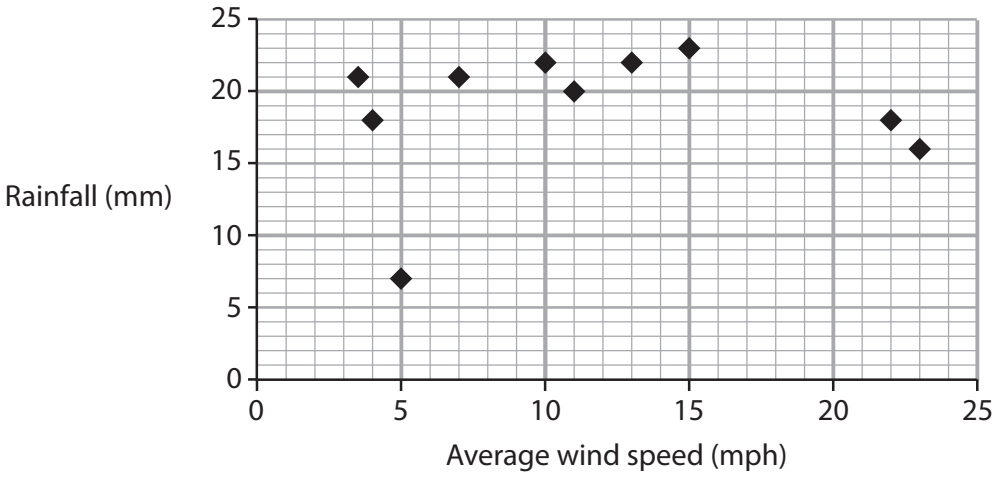


Figure 6a

Extract from student's data presentation

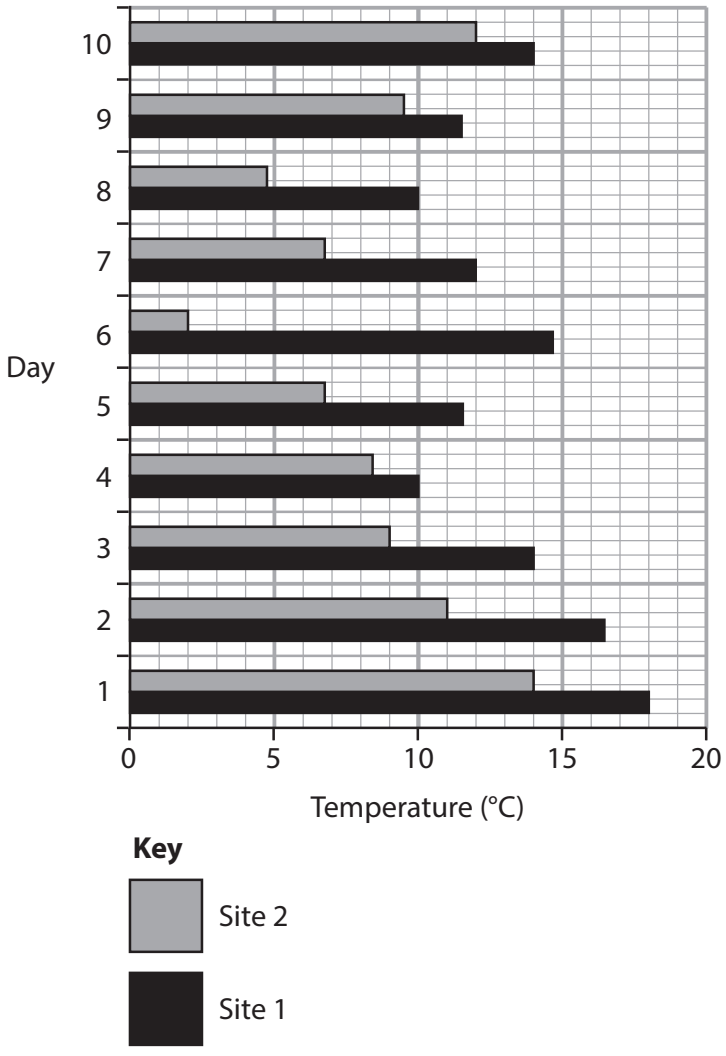


Figure 6b

Extract from student's data presentation

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

You have studied a hazardous environment as part of your own geographical enquiry.

Title of your geographical enquiry

.....

.....

(a) Explain why your fieldwork location was suitable for this enquiry.

(2)

.....

.....

.....

.....

(b) Explain **one** quantitative method you chose for data collection.

(3)

.....

.....

.....

.....

.....

(c) Explain **one** advantage of a technique you used to present your fieldwork data.

(3)

(d) Explain **two** techniques you used to analyse your data.

(4)

1

2

(e) Study Figure 6a and Figure 6b in the Resource Booklet. They show some information about data collection methods from a student's enquiry.

> The aim of the student's enquiry was to determine the most important characteristic that influences local weather conditions.

Evaluate how far the data collection methods used supported the student in achieving their aim.

(8)

- Choose 5 sites at 500m intervals moving away from the school.
- Measure temperature, humidity and windspeed.
- Measure rainfall.
- Record land use.

Figure 6a

Information on the student's data collection methods

Weather characteristics recording sheet

- Measure rainfall and humidity at each site every day for 2 weeks.

	Rainfall (mm)	Humidity (mb)
1		
2		
3		
4		
5		

- Record land use and windspeed at each site.

Site	Land use	Windspeed (km/h)
1		
2		
3		
4		

Figure 6b

Data collection sheet

If you answer Question 6, put a cross in the box ☒.

6 Investigating Hazardous Environments

You have carried out a geographical enquiry as part of your work on hazardous environments.

Title of geographical enquiry

(a) Describe **one** of your data presentation techniques.

(2)

(b) Explain **one** limitation of a secondary data source used in your investigation.

(3)

Secondary data source

(c) Explain **two** ways you could have improved a primary data collection method to increase its accuracy.

(4)

1 .....

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2 .....

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(d) Explain **one** pattern you found in your primary data.

(3)

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(e) Study the data in Figure 6a in the Resource Booklet. It shows some information about the results and conclusion from the students' investigation.

> The aim was to investigate how air pressure and rainfall vary in a location at risk of tropical cyclones.

Evaluate the reliability of the students' conclusions.

(8)

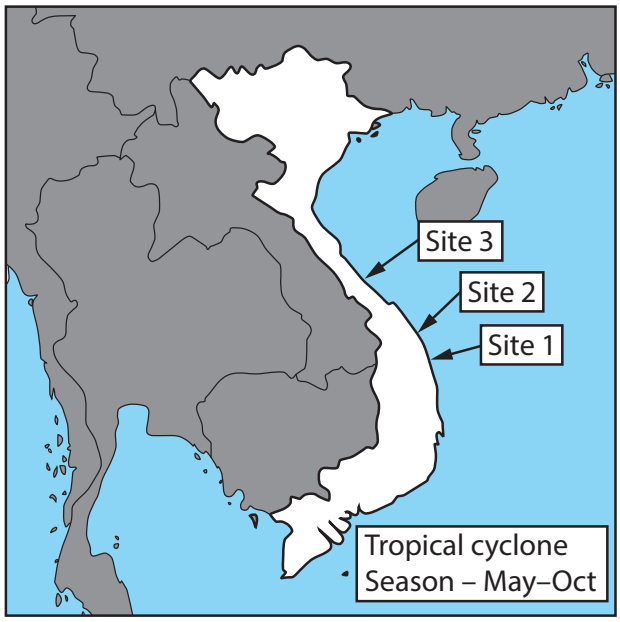
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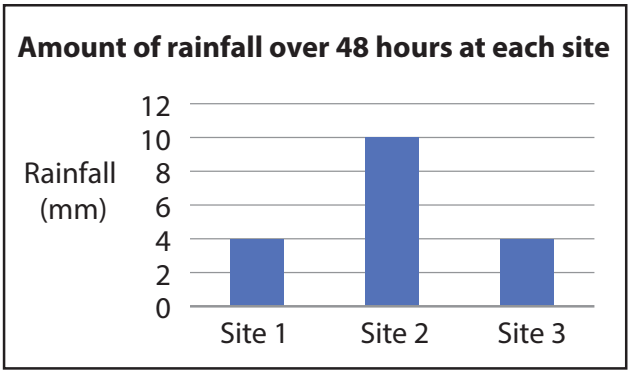
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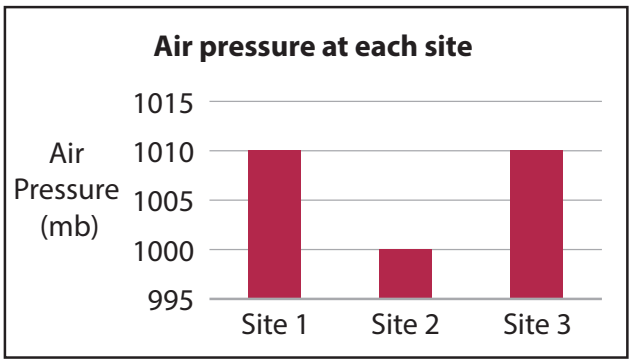
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A group of students carried out an investigation into how air pressure and rainfall vary in a location at risk from tropical cyclones.

Sampling strategy: They chose random sampling to select the three sites where data was collected.

Time of year: The data was collected during one morning in March.

Frequency: To collect their rainfall and air pressure data the students recorded one set of data at each site. They measured the total rainfall after 48 hours at each site.

Conclusion: The students concluded that areas with lower air pressure experience more rainfall.

Figure 6a

Details of the students' extreme weather event investigation

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

A group of students has undertaken an enquiry that investigated changes in the weather as part of their studies into hazardous environments.

(a) (i) Identify **one** piece of equipment used to measure air pressure.

(1)

- ☒ **A** barometer
- ☒ **B** clinometer
- ☒ **C** compass
- ☒ **D** thermometer

(ii) State **one** risk the students should have prepared for when carrying out their hazardous environment fieldwork.

(1)

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.....

(b) Study Figure 6a in the Resource Booklet. It shows some data about the average temperature at the 10 sites where data was collected.

Calculate the range in temperature.

You **must** show all your working in the space below.

(2)

..... °C

(c) (i) Study Figure 6b in the Resource Booklet.

Plot the data for sites 1 and 3, from Figure 6b (shown in the Resource Booklet), on Figure 6c (below).

(2)

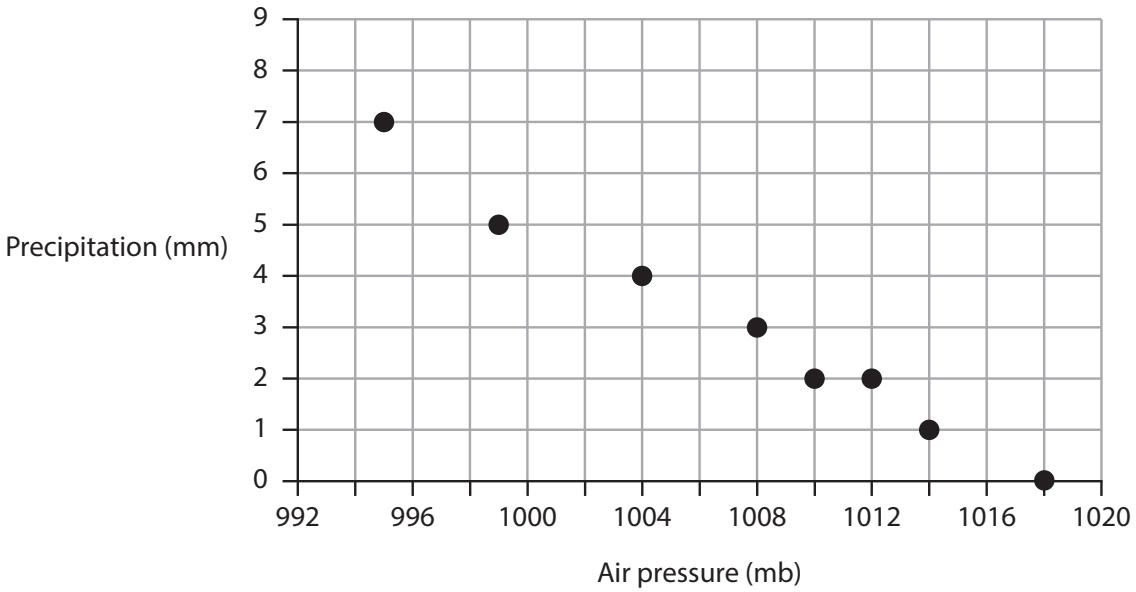


Figure 6c

Relationship between air pressure and precipitation

(ii) Draw a line of best fit on Figure 6c.

(1)

(iii) Suggest **one** reason for the relationship shown on Figure 6c.

(2)

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(d) Explain **one other** primary data collection method students might have found useful in their weather enquiry.

(3)

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(e) You have studied a hazardous environment as part of your own geographical enquiry.

Evaluate the accuracy and reliability of your data collection methods.

(8)

Geographical enquiry title

Site	Average temperature (°C)
1	12
2	18
3	22
4	24
5	24
6	23
7	19
8	17
9	14
10	13

Figure 6a

Average temperature for each site

Site	Air pressure (mb)	Precipitation (mm)
1	**994**	**8**
2	995	7
3	**998**	**6**
4	999	5
5	1004	4
6	1008	3
7	1010	2
8	1012	2
9	1014	1
10	1018	0

Figure 6b

Air pressure and precipitation for each site

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

A group of students has undertaken an enquiry to investigate changes in the weather as part of their studies into hazardous environments.

(a) (i) Identify the best definition of secondary data.

(1)

- ☒ **A** direct collection of original data
- ☒ **B** information collected by other people
- ☒ **C** information collected by you
- ☒ **D** your own fieldwork data

(ii) State **one** type of qualitative data the students could have used in their enquiry.

(1)

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(b) Suggest **one** possible health and safety risk of measuring wind strength.

(2)

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(c) Study Figure 6a in the Resource Booklet.

Calculate the median of the air pressures.

You **must** show all your working in the space below.

(2)

..... mb

(d) (i) Study Figure 6b in the Resource Booklet.

Plot the data for sites 2 and 4, from Figure 6b (shown in the Resource Booklet), on Figure 6c (below).

(2)

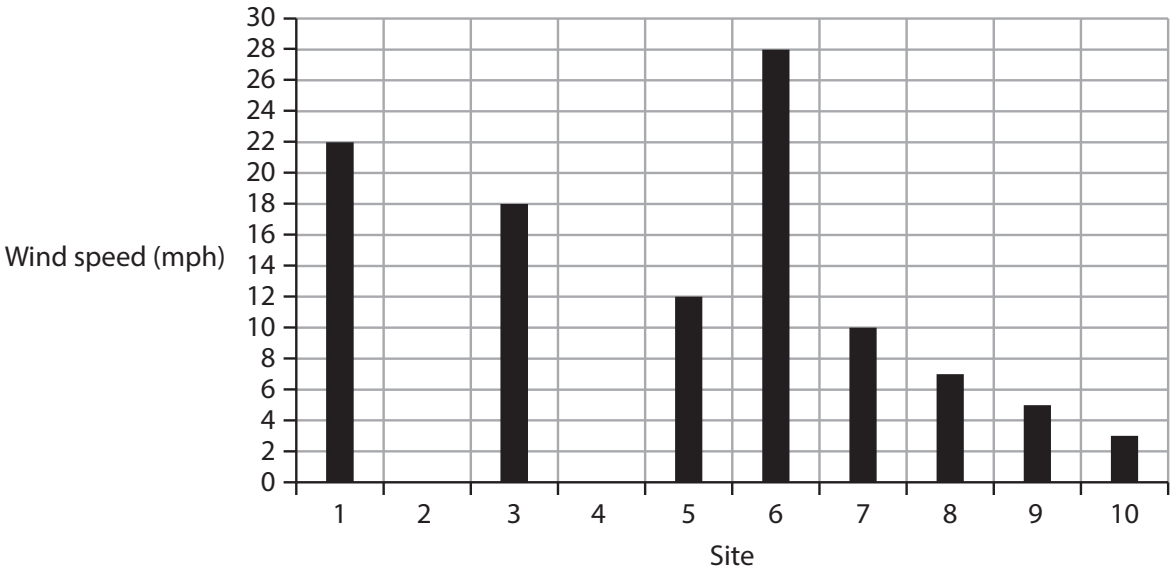


Figure 6c

Wind speed at each site

(ii) Identify at which site there is an anomaly.

(1)

.....

(iii) Suggest **one** possible reason for the anomaly in wind speed on Figure 6c.

(3)

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(e) You have studied a hazardous environment as part of your own geographical enquiry.

State the title of your geographical enquiry.

Evaluate the accuracy and reliability of your conclusions.

(8)

Geographical enquiry title

Site	Air pressure (mb)
1	994
2	995
3	994
4	1000
5	1002
6	1008
7	1004
8	1008
9	1007
10	1008

Figure 6a

Air pressure data for each site

Site	Wind speed (mph)
1	22
2	**20**
3	18
4	**14**
5	12
6	28
7	10
8	7
9	5
10	3

Figure 6b

Wind speed data for each site

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

A group of students has undertaken an enquiry to investigate the changes in weather caused by an extreme weather event.

(a) State **one** piece of equipment the students could have used in their weather enquiry.

(1)

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(b) Explain **one** advantage and **one** disadvantage of using annotated field sketches.

(4)

advantage

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disadvantage

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(c) Study Figure 6a in the Resource Booklet.

Calculate the percentage increase in temperature from day 1 to day 6.

You **must** show all your working in the space below.

(2)

..... %

(d) (i) Study Figure 6b in the Resource Booklet.

Plot the data for site 4 from Figure 6b (shown in the Resource Booklet) to complete Figure 6c in the Question Paper.

(2)

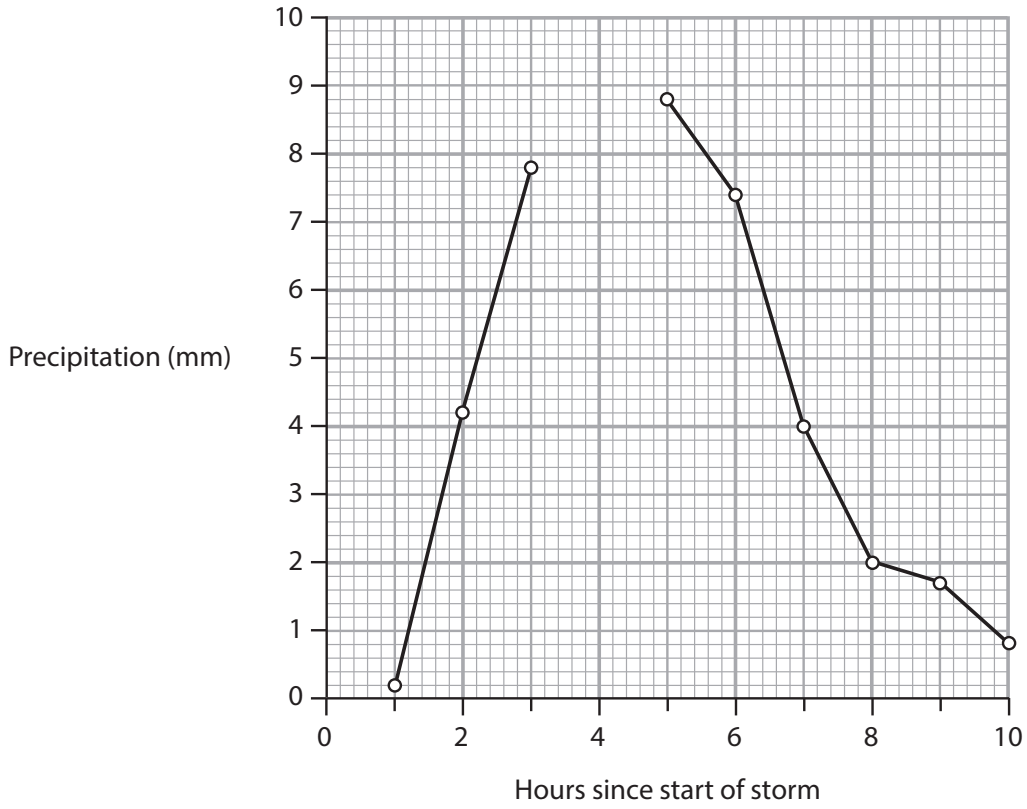


Figure 6c

Graph comparing hours since start of storm and precipitation

(ii) Suggest **one** conclusion the students could reach based on the data shown in Figure 6c.

(2)

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(iii) Identify the best definition of the term anomaly.

(1)

- ☒ **A** data that can be counted in numbers
- ☒ **B** data that does not fit the pattern
- ☒ **C** the general pattern of data
- ☒ **D** the way data is spread out

(e) You have studied a hazardous environment as part of your own geographical enquiry.

Evaluate how effective your site selection and sampling strategies were in helping you answer your enquiry title.

(8)

Geographical enquiry title

Day	Weather conditions	Mean temperature (°C)
1	Clear	5
2	Clear	7
3	Clear	7
4	Cloudy	8
5	Very cloudy	10
6	Very cloudy	13
7	Cloudy	10
8	Clear	9
9	Clear	9
10	Clear	6

Figure 6a

Extract from a weather diary showing mean daily temperature and weather conditions

Hours since start of storm (low pressure system)	Precipitation (mm)
1	0.2
2	4.2
3	7.8
4	**8.0**
5	8.8
6	7.4
7	4.0
8	2.0
9	1.7
10	0.8

Figure 6b

Recorded precipitation since the start of a storm

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

You have carried out a geographical enquiry as part of your work on hazardous environments (an extreme weather event).

Title of geographical enquiry

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(a) Describe **one** sampling strategy used to select your sites for data collection.

(2)

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(b) Explain **one** quantitative method you chose for your data collection.

(3)

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(c) Explain why **two** different named data presentation techniques were appropriate for the data being plotted.

(4)

Name of data presentation technique 1

technique 1

Name of data presentation technique 2

technique 2

(d) Explain **one** reason collecting more data can make your investigation more reliable.

(3)

(e) Study the data in Figure 6 in the Resource Booklet. It shows secondary data collected for background research to help produce a hypothesis.

Students' hypothesis: **As wind speed increases, air pressure decreases**.

Note: A hypothesis is a prediction or guess about what is going to happen in the students' fieldwork.

Evaluate how suitable the hypothesis reached by the students is in helping to answer their enquiry question.

You **must** refer to the resource in your answer.

(8)

If you answer Question 6, put a cross in the box ☒.

6 Investigating hazardous environments

You have carried out a geographical enquiry as part of your work on hazardous environments (an extreme weather event).

Title of geographical enquiry

.....

.....

(a) Describe **one** health and safety risk included in your risk assessment.

(2)

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(b) Explain **one** data collection method used to help answer your enquiry title.

(3)

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(c) Explain **two** ways you ensured your data presentation was accurate.

(4)

1 .....

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2 .....

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(d) Explain **one** reason why there might be an anomaly in the data you collected.

(3)

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(e) Study the data in Figure 6 in the Resource Booklet. It shows some information about the secondary data the students used to support their enquiry.

Conclusion: **Miami has the highest precipitation in Florida.**

Evaluate the extent to which the secondary data supported the students' conclusion.

You **must** refer to the resource in your answer.

(8)

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MARK SCHEMES

official Pearson Edexcel mark schemes

Question 3

Question number	Answer	Mark
3(a)	**AO1 (1 mark)** B the point on the earth's surface directly above the focus A, C, D are incorrect because they are not directly above the focus	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** Award 1 mark for any of the following: • Mercalli scale (1) Also accept: • Moment Magnitude scale / MM / MMI / MMS (1) • Richter scale (1) Do not accept: • seismograph / seismometer • impacts of earthquakes e.g. damage to buildings, deaths etc.	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following: • lava (1) • ash clouds (1) • gas emissions (1) • lava bombs (1) • earthquakes / tremors (1) • pyroclastic flow (1) • mudslide / mass movement (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for a point about a cause of an earthquake and 1 mark (AO2) for further explanation, up to a maximum of 2 marks. A sudden tremor of the earth's crust (1) caused by tectonic activity at plate margins and faults (1) Earthquakes are caused by built up pressure inside the earths' crust (1) which is released when tectonic plates move (1) Accept any other appropriate response, including those referring to fracking, nuclear testing and volcanic eruptions.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO2) for the identification of an idea from the map in fig 3a and a further mark (AO3) for further development, shown on Figure 3a, Candidates should respond with one cause and one direction. Cause Warm sea temperatures (1) Tropical cyclones tend to develop where temperatures are above 27 degrees (1) Low air pressure (1) which pulls water high as the cyclone gathers speed (1) Direction Tropical cyclones move in the direction of the prevailing wind (1) these are common wind directions caused by convection currents / earth's rotation / Coriolis Effect / Trade Winds (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. Earthquakes under the sea bed form shock waves (1) this forms a wave which splits (1). The wave then gets bigger (amplifying) and hits the shore (1) Tectonic plate movement can trigger an underwater earthquake (1) which causes tremors under water causing waves (1) the waves can increase in height over a large distance (1) Accept any other appropriate response	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for the following. The building is on stilts (1) The building is off the ground (1) Idea of strong / reinforced base (1) Shatterproof windows (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. 1+1+1+1 2+2 3+1 Lack of education (1) meaning people don't know what to do (1). Lack of emergency planning (1) meaning when the event occurs there is little or no response in a short period of time (1) Low level of economic development (1) meaning there is no re-source available to respond (1) resulting in chaos and panic when the event occurs (1) and a lack of resource to rebuild (1) Some countries experience a high frequency of natural hazards (1) which means that they do not have enough time / money to respond sufficiently (1) so additional money needs to be spent on	

	recovery (1) which limits opportunity for increasing the level of development (1) Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about investigating the issue of why hazard mapping can be useful in managing earthquake risk. Candidates could explore the use of hazard mapping before, during and after an earthquake event. Use of both resources needed for level 3 **AO3** • Hazard/vulnerability/risk maps can be used in a variety of ways before, during and after a hazardous event. • Candidates should examine how the use of Hazard maps can impact against impacts • Road structures identified through hazard maps could be used to enable emergency aid to get to an earthquake zone more quickly enabling the relief effort to start. • Hazard maps shared with all support agencies can enable a more coordinated relief effort ensuring resources are not wasted /deployed in the wrong area. • Using hazard maps can help plan in the short term where services where before and where they can be built afterwards **AO4** • Fig 3c shows stages in the process of hazard mapping • Fig 3c data can be collected on hazard events to help develop strategies to reduce the impact of earthquakes, for example understanding areas where they happen frequently • Fig 3c data can be presented and shared across a wide variety of organisations to help them plan better for hazard events • Fig 3c assessments can be made to identify trends and patterns in hazard data and present in the form of vulnerability and risk maps • Fig 3c data can be used to inform land zoning • Fig 3d shows Hazard, vulnerability and risk • Fig 3d shows there is a positive correlation between the three maps • Fig 3d shows that as the hazard risk rises so does vulnerability generally • Fig 3d shows that in some cases even though risk is high vulnerability is only moderate

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question 3

Question number	Answer	Mark
3(a)	**AO1 (1 mark)** **D is the correct response - plates push together and one plate is destroyed.** A and C are not correct as they describe constructive plate margins B is not correct s it is not an accurate description	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **C is the correct response - Volcanic Explosivity index** A, B and D are all inaccurate measures of volcanic hazards	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following: • Education / knowledge / awareness (1) • Emergency plan / warning systems / prediction / management (1) • (Level / quality) of infrastructure (1) • Age / quality / strength of buildings (1) • (Level of) development (1) • Population density / population age (1) • Land-use (1) Accept any other appropriate response. **Reject population without any context, e.g. age**	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for the identification of a physical impact (1) and 1 mark (AO2) for further explanation, up to a maximum of 2 marks. • Ash from the volcano is ejected into the atmosphere (1) the ash causes physical damage to property and agricultural land (1) • Lava flows ejected from the volcano can travel up to 10km (1) destroying buildings and agricultural land (1) • Impact ash from the volcano mixes with mud and water (1) creating a mudflow which destroys building and farmland (1) Accept any other appropriate response	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO2) for identification of how a factor could affect the distribution and a further mark (AO3) for further development shown on Figure 3a. Candidates should respond with two different factors. • Sea temperatures – Tropical cyclones tend to develop where temperatures are higher 24-27 degrees (1) this means that convection currents will be high enough to maintain the cyclone vortex (1)/provides energy to feed the cyclone. • Cyclones tend to develop in the tropics (1) as this where the temperature and humidity are highest (1) • Low air pressure pulls wind in and increasing intensity (1) this churns up the water developing the cyclone (1) • Strong winds caused by the Coriolis effect (1) gives a tropical cyclone its rotation anticlockwise in the northern hemisphere (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO3 (3 marks)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. • Hotspots – this is a point at which material from deep inside the earth's mantle (1) is pushed to the surface by convection currents (1) as this material breaks through the earth's crust it forms volcanoes which can lead to physical and human impacts (1) • Hot spots are plumbs of magma (1) that are pushed through a weakness in the earth's crust (1) to form volcanoes (1)	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for one of the following. • Cross bracing (1) • Reinforced concrete (1) • Concrete exoskeleton (1) • Strong foundations (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. Responses could include: • Lack of education (1) so they don't know any better / poor decision-makers (1). • Always lived at the location and don't think it will happen to them (1) so there is and acceptance of risk (1). • Economic reasons meaning they can't afford to move (1) and worry about not being able to find a job elsewhere (1). • Where they live is a highly developed areas (1) may not want to move away tradition / family / they have made and investment of time and money (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Use of both resources needed for level 3 **AO3** • GIS can be used in a variety of ways before during and after a hazardous event. • Candidates should examine how the use of GIS can impact against elements identified in Figure 3c. • Road structures identified through GIS could be used to enable emergency aid to get to an earthquake zone more quickly enabling the relief effort to start. • Coordinated GIS maps shared with all support agencies can enable a more coordinated relief effort ensuring resources are not wasted /deployed in the wrong area. • Using GIS can help plan in the short term where services where before and where they can be built afterwards • Candidates will outline the immediate short term and longer term effects of the disaster event and outline how this affects QOL **AO4** • Fig 3c shows how quality of life changes in response to a disaster event • Fig 3c shows that initially after the disaster event the quality of life/economic activity and social stability goes down • Fig 3c as relief arrives these begin to increase back to normal levels over time • Fig 3d provides a variety of ways in which GIS can be used to support earthquake response • Fig 3d outlines the stages that can be used to develop an understanding of hazard management

	• Fig 3d suggests the correct way planners should use data to support emergency management

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question number	Answer	Mark
3(a)	**AO1 (1 mark)** **A** Emergency aid (1) is a short term response B, C, and D are longer term responses so are incorrect	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **C** Families separated (1) is the correct response A, B, And D are all physical impacts so are incorrect	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for the following: • Richter scale (1) • Moment magnitude scale (1) • Magnitude scale (1) As the question is about natural hazards candidates may give examples relating to measuring other natural hazards or how to measure them. Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark for the identification of the method of relief (AO1) and a further mark for further development (AO2) up to a maximum of 2 marks: • Long term planning such as storm shelter development (1) can provide the general population with somewhere safe to stay during a cyclone event (1). • Investment/foreign aid can be used to develop early warning systems (1) which means people can evacuate (1). As the question is about natural hazards candidates may give examples relating to cyclones or volcanoes. Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for identification of any idea from Fig 3a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • The climate is of a good quality (1) and gives people a good quality of life (1). • Tourism provides a source of income (1) few other job opportunities in the area (1). • People may have low income (1) and are therefore not able to move (1). • The city is very developed/provides jobs (1) so people don't want to move (1). Accept any other appropriate response.	

		(4)

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark for the identification of a way in which government can help prepare the population and 2 marks for development through further explanation up to a maximum of 3 marks. • Governments can prepare people for a hazardous event by carrying out emergency drills (1) which involves the population practicing what to do (1) and where they should go increasing the chances of them surviving (1). • Governments can prepare people for a hazardous event by investing money (1) in earthquake proof infrastructure/new technology (1) which means that people will have time to evacuate buildings more efficiently (1). • Governments can prepare people for hazardous events by creating evacuation plans (1) which can be shared with the population (1) so that the people know what to do in the event of an earthquake (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for the following: • Smoke plume/Gas/Lava bombs/Dust Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. • Earthquakes occur at plate margins (1) as the plates move together it is known as a destructive plate margin (1) one of the plates is destroyed as it gets pushed beneath the other plate (1) this process is called subduction (1). • Two plates moving in opposite directions (1) get stuck and pressure builds up (1) and when the plate slips (1) pressure is released and causes the ground to shake (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysis of the differences between tropical cyclones. Candidates will be expected to identify and compare differences between two examples. For higher level candidates there should be a link between the level of damage/location and strength of the cyclone. AO3 • The impact of tropical storms will vary depending on the level of development in an area. • The impact of the tropical storm will depend on the physical strength, duration and size of the storm • Countries that have effective warning systems should be better prepared for the event • More developed countries can often afford to spend more on prediction and emergency procedures limiting the amount of deaths. • Highly urbanised areas are likely to suffer a greater financial burden. AO4 • Fig 3c tells us that the level or preparedness has an impact on the number of deaths. • Fig 3c tells us that rural areas do not suffer the same level of damage as urban areas. • Fig 3c shows there are differing levels of damage between the two cyclones.

	• Fig 3c Shows the impact of the cyclone in the USA was much higher. • Fig 3c shows the size of the storm is different 600/1500km and that the wind speed of the larger storm is slower.	
Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.

Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question 3

Question number	Answer	Mark
3(a)	**AO1 (1 mark)** **D** rebuilding settlements (1) is correct as it is a longer-term response. A, B, and C are all incorrect as they are short term responses.	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **A** Buildings damaged (1) is the correct response as it is a short-term impact. B and C are incorrect as they are human impacts. D is incorrect is incorrect as it is associated with earthquake hazards.	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for the following: • Saffir-Simpson scale (1) • Weather stations (1) • Anemometer (1) • Satellite systems (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark for the identification of the method of relief (AO1) and a further mark for further development (AO2) up to a maximum of 2 marks. • Short term relief such as tents (1) can provide the general population with immediate shelter following a tropical storm. (1).	

	• Food parcels reduce the risk of starvation (1) because they provide people with immediate food which they don't need to pay for (1). Accept any other appropriate response	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for identification of any idea from fig 3a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Quality of Soil (1) People may work in farming and the quality of the soil means that they are able to produce a good crop year on year (1). • Geothermal energy (1) provides people with a low-cost source of energy (1). • Areas rich in mineral deposits (1) may cause people to stay because it gives a source of income (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark for the identification of the feature and 2 marks for development through further explanation up to a maximum of 3 marks. • Financial cost (1) cost of repairing damage (1) such as billions of $ repairing damaged roads and flooded infrastructure (1). • Buildings damaged (1) so people demand higher building standards (1) to help protect them from the cyclone impacts (1). • Cyclone damage (1) leads to investment by governments/relief organisations (1) which is used to develop better early warning systems (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for the following: • Eye of the Storm (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. • Destructive plate boundaries are formed where 2 plates move towards one another (1) The edge of one plate is destroyed (1) as it is pushed beneath the other (1) this is called subduction (1). • Two plates move towards each other (1) and the oceanic plate is forced under the continental plate (1) because it is heavier (1) and friction causes melting of the plate (1). Candidates may talk about different density of material. Candidates can be awarded marks for a diagram with appropriate annotations, which develop an explanation. Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysis of the extent of different hazardous events Candidates should be able to identify linkages development levels, levels of preparation and magnitude of the events. **AO3** • Fig 3c Some countries (New Zealand and Japan) in the world that experience earthquakes have a high level of economic development so can afford to spend more money on improving the country's infrastructure, e.g. earthquake proof buildings, than countries with a lower level of development. • Fig 3c Countries that have effective warning systems, rescue services, medical services, education systems and building design, tend to have less damage from an earthquake. • Fig 3c (Haiti)Countries that are less economically developed cannot afford to spend as much money to protect themselves from earthquakes, so it is likely that these areas will have a higher death toll, even if the magnitude of an earthquake is the same as the magnitude in a more developed country. • Fig 3c (Japan and New Zealand) More-developed countries can afford to spend money on prediction methods, such as GPS satellite (when data is sent from satellites to computers with information such as plate movement and changes in the earth's surface). In the developing world, communication systems may be underdeveloped, so the population may not be well educated about what to do in the event of an earthquake. • Fig 3c (Haiti) Construction standards tend to be poorer in less - developed countries. Homes and other buildings suffer serious direct damage when the disaster occurs. Buildings collapsing result in high death tolls. • Evacuation and other emergency plans are also difficult to put into action due to limited funds and insufficient resources. Clearing up

	can be difficult. There may not be enough money to rebuild homes quickly and safely, which leads to many people being forced to live in emergency housing or refugee camps –which can increase the death toll. **AO4** • Fig 3d shows that the Japan earthquake had a much higher magnitude that the Haiti earthquake. • Fig 3d shows that Haiti had a very high number of deaths compared to Japan. • Fig 3c shows that although Haiti had a low cost of repair it had the highest death toll. • Fig 3c shows that level of GNI has a correlation to the amount of deaths as a result of the earthquake event.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** D (Seismograph) (1) The answer cannot be A (measure for river speed), B (measures water vapour in the air), C (used to measure size of an earthquake).	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** C (Saffir-Simpson scale) (1) The answer cannot be A, B or D as these are incorrect.	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Warm air (1). • Moist air (1). • Warm sea (1). • Circular motion of air (1). • Around the equator/between the tropics (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identification of correct impact and a further mark for explanation (AO2) up to a maximum of two marks. • Destruction of buildings/infrastructure (1) caused by high winds (1). • Flooding (1) caused by associated heavy rain (1).	

	• Storm surge (1) loss of life (1). • Trees blown down/destruction of habitats (1) causing damage or loss of life (1) Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason from Fig 3a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Proximity to a plate boundary (1) increases likelihood of experiencing a hazard (1). • Megacities have high population densities (1) and therefore more people who may be impacted by a tectonic hazard event (1). • Some countries such as China have megacities located on plate boundaries (1) which means higher populations are at risk (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark for the identification of a strategy which could reduce risk from the impacts of an earthquake event and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Early warning systems (1) to allow people evacuate (1) which could reduce deaths (1). • Building earthquake resistant buildings/example of approach (counter weight / Concrete exoskeleton) (1) to reduce damage from ground shaking (1) which should result in less injuries (1). • Practicing earthquake drills (1) so people know how to correctly respond to an earthquake event (1) which should reduce the risk of injury (1). Accept any other appropriate response.	**(3)**
Question number	**Answer**	**Mark**
3(e)	**AO3 (1 mark)** Award 1 mark for the following: • Conservative / transform (1)	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. 1+1 and 1+1 or 1+1+1+1 • On a destructive plate margin two plates push together until one is subducted (1). As the plate is pushed down the rock melts (1) and builds up pressure under the earths surface (1). Lava is ejected and cools to form a layer of a volcano (1). • On a destructive plate margin one plate is subducted under the other (1) which means that molten magma is released (1) and rises to surface (1). • However at a constructive plate margin plates moves apart (1) and magma rises up to fill the gap (1) and erupts at surface as a volcano (1). Candidates may also focus on volcano formation at constructive plate margins or hot spots. Annotated diagrams are acceptable but must explain the process and ensure there is no double reward. Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the difference between the short- and long-term impacts of the earthquake event. **AO3** • There are a range of short- and long-term impacts of earthquakes which can vary due to the size and intensity of the earthquake as well as the location. • Short-term impacts which occur as a result of ground shaking are often very destructive causing buildings to collapse for example, transport and communication links being disrupted, with the results including injury and death. • Long-term impacts which occur as a result of the damage made by the earthquake event can have a large impact on society as they have the potential to put a large strain on society. For example, when large numbers of people lose their homes, or water supplies are contaminated. • The level of impact can be influenced by the level of development of the country and its ability to respond to short term impact and as a result the longer-term response to the hazardous event. • The level of intervention from outside agencies/national government will have a direct influence on the ability to reduce the impacts of the hazardous event. • The location and accessibility can also affect the ability to reduce impacts in both the long and short-term.

	AO4 • Fig 3c shows a map of perceived shaking in the Haiti 2010 earthquake. It shows how there was a large area of perceived extreme shaking in Port-au-Prince. • Figure 3c suggests shows that the short-term impacts affected a large amount of people (220,000 people killed/ 300,000 injured). • Figure 3c indicates how there were serious longer-term impacts which will have also affected a large amount of the population, particularly given the Figure shows that large percentages of some cities were destroyed. • Figure 3c indicates how some of these impacts could include the shortage of aid supplies and outbreaks of cholera. • Figure 3c shows the high magnitude of the earthquake. • Figure 3c suggests a high level of disruption to infrastructure. Candidates may use compass bearings and scale to support their response.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** C (Tectonic plate movement) (1). The answer cannot be A (incorrect), B (impact of an earthquake not an influence or D (incorrect).	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** B (Satellite technology to track development of storms) (1). The answer cannot be A (related to earthquakes), C (a response to address the impact not to plan for cyclones), or D (related to tectonic hazards).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Family ties keep mean they want to stay (1) • Unaware of the risk (1) • No ability to move (1) • Fertile soils (1) • Lack of ability to move (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identification of correct impact and a further mark for explanation (AO2) up to a maximum of two marks. • Closure of businesses/job loss (1) means loss of income (1). • Increased government debt (1) due to funds needed for emergency responses (1). • Damage to infrastructure (1) cost money to repair (1). • Loss of income from tourism (1) due to closure of airports/hotels (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason from Fig 3a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Location on a coastline (1) which means they are closer to where a tropical cyclone could hit land (1). • Location within the latitudes where tropical cyclones are most frequent (1) therefore risk is higher of cyclone reaching the population (1). • Some countries may have higher population at risk (1) therefore the potential damage is higher (1). • India has between 1001 – 10000(1000's) people at risk (1) because of a low level of development (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark the identification of the cause, with two further marks for development. For example: • Two plates rub against each other at a plate margin (1) there is a build up in stress (1) which is released as an earthquakes when the plates moves (1). • Two plates meet (1) causing friction (1) which results in earthquakes at the fault lines (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for the following: • Lava flow (1). • Pyroclastic flow (1). • Ash (1).	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. • Volcanoes usually form on a destructive or constructive plate boundaries (1). However, where there are plumes of molten rock (1) which rise through the mantle and cause the crust to melt (1) this creates hotspots (1). • Hotspots (1) such as the Hawaii (1) are formed where the earth's crust is thinner (1) allowing molten material rise to the surface more easily (1) • Hotspots (1) form where the earth's crust is thinner (1) allowing molten material to rise more easily (1) due to convection currents (1) Accept any other appropriate response.	**(4)**

Question number	Answer indicative content	Mark (8)
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the different strategies that can be used for preparing for earthquakes factors that can affect flood risk in different places. Candidates will need to be able to identify why different factors are important. **AO3** • There are a range of ways countries can prepare for earthquakes. • It is important to educate the potential population that could be affected so that they know how to respond in the event of an earthquake. This has the potential to reduce the number of deaths and injuries. • Some countries may try to have a warning system that informs people at risk when seismic activity is detected. But this relies on people having access to a phone/signal etc. • Some countries try to prepare by ensuring buildings are more resistant to ground movement from earthquakes, but this requires a high level of investment and will not be accessible for everyone. **AO4** • Fig 3c show how in Japan education is used to prepare for what to do in case of an earthquake. • Figure 3c indicates a way to prepare is through strengthening buildings. • Figure 3c shows how there are large number of high magnitude earthquakes spread across Japan. • Figure 3c shows how evacuation plans could be used as a way to prepare for an earthquake and could be useful for emergency services.	

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** B (Constructive) The answer cannot be A (not a plate boundary), C (not found at a plate boundary) or D (part of the earth's crust).	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** D (eye in the centre) The answer cannot be A (low pressure in a tropical cyclone), B (high rainfall), C (high wind speeds).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for a suitable factor: • (Warm sea surface) temperature (1) • Coriolis force (1) • Wind shear (1) • Converging winds (1) • Air pressure (1) • Latitude (1) • Climate / seasonality (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identification of correct impact and a further mark for explanation (AO2) up to a maximum of two marks. • Damage to infrastructure (1) which requires heavy investment from the government (1). • Peoples' homes are destroyed (1) so can lead to homelessness and development of makeshift settlements (1). • Damage to crops (1) which means farmers risk having no money to buy seeds for next season (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Serious eruptions may be considered to be rare (1) and so not considered a serious threat by residents (1). • Slopes of the volcano are very fertile (1) so many people remain to be involved in agriculture (1). • With so many settlements present people may have family connections (1) which they do not want to leave despite the risks (1). • Farming communities (typical in small settlements) as crops grow well (1) because soil is very fertile (1).	

	• People may have no choice (1) as house prices might be cheaper (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(e)	**AO2 (3 marks)** Award 1 mark for the identification of a suitable reason and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Building designs can ensure they are less likely to damage during an earthquake event (1) through steel frames that sway during the earth's movement / rubber shock absorbers in foundations (1) which means it is less likely to create debris (1). • Buildings which were originally built without earthquakes in mind can be retrofitted (1) for example wire mesh to try and strengthen buildings (1) and reduce the number of buildings which would collapse (1). • Buildings can be designed with lightweight roofs or safety glass (1) so that they are less likely to break during an event (1) and so reduce the number of injuries (1). • Strict building codes (1) ensure buildings are built to reduce movement during an earthquake (1) making them less likely to collapse (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(f)	**AO3 (1 mark)** Award 1 mark for the following: • Flooding (1) • Damage to buildings (1) • Power cuts (1) • Trees blown down (1) • Homelessness (1) • Deaths / injuries (1) • Habitats destroyed (1) Accept any other reasonable response linked to the resource.	**(1)**

Question number	Answer	Mark
3(g)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. Credit annotated diagrams where provided, but do not double credit ideas if repeated in the written text. • Oceanic and continental plates move towards each other (1). Oceanic plate melts as it sinks below the continental (1) as the temperature increases with depth in the Earth's crust (1) this creates magma which rises through the continental crust to form a volcano (1). • Two tectonic plates move towards each other / meet (1) one is pushed under the other /subducted (1) and melts due to the heat within the Earth's crust (1) and the resulting magma rises to the crust's surface to form volcanoes (1). Accept any other appropriate response. Accept answers that use an annotated diagram.	**(4)**

Question number	Indicative Content
3(h)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the pattern of vulnerability to tropical cyclones. **AO3** • Vulnerability to tropical cyclones is affected by the conditions that are needed for tropical cyclone formation. • Countries will be vulnerable at different times of year, depending on their location. • Climate change has been linked with higher frequency of tropical cyclones, and for a shift in where they are taking place. This means that there is the potential for a greater proportion of the world's population to be at risk. • Hazard risk is a combination of the hazard (and its severity) and vulnerability. Many of the coastal areas in zone which have a high probability of a high intensity tropical storm have dense populations which increases the hazard risk. • Hazard frequency, and even intensity does not necessarily create high hazard risk. For example, those areas in the Pacific Ocean which do not have islands, the risk is low, compared to around the Philippines which have high population density and high probability of a storm up to 5 on the Saffir Simpson scale mean that hazard risk is high. **AO4** • Fig 3c shows how tropical storms can vary in intensity from 1-5 on the Saffir-Simpson scale.

	• Figure 3c shows area where there is a 10% probability of a storm striking, and the predicted intensity. • Figure 3c shows how there are large areas of South East Asia and Oceania which are highly vulnerable to tropical storms. • Figure 3c shows how the vulnerability is linked to seasonal changes for example in Bangladesh September to May being storm season.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4–6	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	7–8	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** C eye (1) The answer cannot be A (irrelevant), B (type of plate margin), or D (part of the earth's crust).	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** D point on the earth's surface directly above the focus (1) The answer cannot be A (plate boundary), B (not correct), or C (focus).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for a suitable characteristic: • Earthquake intensity (1) • Distance from epicentre / depth of focus (1) • Type of plate boundary (1) • Population density (1) • Building density (1) • Time of day (1) • Prevalence of buildings designed for earthquakes / level of preparation (1)	

	Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identification of correct factor and a further mark for explanation (AO2) up to a maximum of two marks. • Tropical cyclones need a supply of heat and moisture from the ocean surface to form (1) so they are usually found in between the tropics (1). • Tropical cyclones need warm waters (of at least 26°C) to form (1) so they are distributed around the equator (1). • Tropical cyclones are found between the tropics (1) because they require low air pressure (1). • A circulatory motion of air (1) caused by the Coriolis force (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any suitable reason why people live in areas at risk of tropical cyclones and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Residents are aware of the risk but accept that as part of life in that area (1) but do not feel the risk is high enough to move home (1). • Education of local people in areas at risk of tropical cyclones (1) so they know how to respond during an event for example where the nearest shelter is (1). • Despite information sharing about the risks of tropical cyclones (1) local residents may not have the resources to move away (1). • People may be financially unstable (1) so have no choice but to stay (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(e)	**AO2 (3 marks)** Award 1 mark for the identification of a suitable way and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Hazard mapping involves making a risk assessment (1) which can help inform town and city planners (1) where buildings need to have reinforced structures / or whether planning permission should be given (1). • Hazard mapping involves identifying the areas at most risk. (1) It will provide information for the public about their level of risk based on location (1) and to support the development of evacuation plans etc. should an earthquake take place (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(f)	**AO3 (1 mark)** Award 1 mark for the following: • Homelessness (1) • Outbreaks of disease (1) • Lost income for businesses (1) • High costs of rebuilding (1) • Power cuts (1) Accept any other reasonable response.	**(1)**

Question number	Answer	Mark
3(g)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. • Oceanic and continental plate move towards each other (1). Oceanic plate melts as it sinks below the continental (1) due to friction (1). When this friction is released it causes an earthquake (1). • Oceanic and continental plate move towards each other (1). The denser oceanic plate sinks beneath the continental plate (1) As the oceanic plate is still rigid (it has not started to melt) this produces friction (1). This friction builds until seismic waves are released (1). Accept any other appropriate response. Accept answers that use an annotated diagram.	**(4)**

Question number	Indicative Content
3(h)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing reasons for the different impacts from the two volcanic eruptions (Anak Krakatoa, Volcan de Fuego). **AO3** • Impacts from volcanic eruptions will vary based on its location, size, and length of the eruptive episode and on how prepared local areas were for the eruption. • Volcanic eruptions will differ in character: some produce more ash which can lead to damage and disruption very long distances away from the eruption; others may cause pyroclastic flows or lahars which make it difficult to prevent any damage and have the potential to lead to greater destruction and /or casualties. • If places at risk from volcanic eruptions have prepared sufficiently for an eruption the public and local emergency services will be ready to act in terms of evacuating people at risk (as was seen with the 2021 eruption of Mount Soufriere). **AO4** • Fig 3c shows information about two volcanic eruptions that took place in 2018 but with different impacts. • Figure 3c shows how the eruption of Anak Krakatoa in Indonesia led to 429 deaths and 14,059 people injured with an eruption that led to a significant change to the physical structure of the volcano. • Figure 3c shows how the eruption of Volcan de Fuego in Guatemala led to 190 deaths largely due to pyroclastic flows and ash falling. It suggests that evacuation played a role in reducing the number of deaths as has been seen in 2021 eruption of La Soufrière.

	• Figure shows that despite Volcan de Fuego being close to settlements (and on land rather than in the sea) this did not necessarily lead to higher deaths.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4–6	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	7–8	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** A Landslide (1) The answer cannot be B (associated with volcanoes), C or D (associated with tropical cyclones).	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** C Tectonic plates that pull apart (1). The answer cannot be A (collision), B (collision, destructive), or D (conservative).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for a suitable definition of hotspot. • An area of tectonic activity away from a plate margin (1). • Magma plumes that create volcanoes in areas of thin crust (1). • Magma plume hotter than surrounding magma (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identification of correct impact suitable way and a further mark for explanation (AO2) up to a maximum of two marks. • Earthquake drills (in schools) (1) to ensure people know how to respond to earthquakes (1). • Governments to send out leaflets (1) to ensure people know where to shelter during an earthquake (1). • Emergency service drills (1) to try and reduce the number of lives lost during an earthquake event (1). • Building earthquake-proof buildings (1) to reduce the number that collapse (1). • Secure furniture (to walls/floor) (1) to reduce risk of injury (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • High wind speeds (up to 252kph) (1) can lead to damage to buildings and infrastructures (1). • Heavy rainfall that are associated with tropical cyclones (1) can cause flooding (1). • Strong winds (at Category 3 and above) (1) can cause storm surges (1) which can flood coastlines (1). • Vegetation might be damaged (1) at wind speeds above 178km (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(e)	**AO2 (3 marks)** Award 1 mark for the identification of a suitable reason and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Emergency aid can respond to short-term impacts of earthquakes (1) including providing immediate medical care and equipment for those injured (1) which can reduce the number of deaths (1). • Emergency aid such as provision of shelters can help reduce long-term impacts (1) such as homelessness (1) and can help people rebuild their lives (1). • Emergency aid in the form of financial support can help local areas get services active again (1) so have all the essential services they need (1) and so can reduce risks of death and illness (1). Accept any other appropriate response. **No credit for just identifying an emergency aid strategy**	**(3)**

Question number	Answer	Mark
3(f)	**AO3 (1 mark)** Award 1 mark for the following: • Eye (1)	**(1)**

Question number	Answer	Mark
3(g)	**AO1 (2 marks) AO2 (2 marks)** Award 1 mark for initial point (AO1), a further mark (AO2) for the extension of this point up to maximum of 2 marks. • Volcanoes can eject a mix of hot steam, ash rock and dust (1) which can form pyroclastic flows which can travel at high speeds (1). • Volcanoes can eject ash (1) which can cover things causing a lot of damage / respiratory problems (1). • Lava flows (1) can damage buildings / habitats (1). • If volcanic ash mixes with rainfall or meltwater lahars can form (1) which can set as hard as cement (1). • Pyroclastic flows (1) can incinerate buildings / infrastructure (1). • Volcanic eruptions can causes earthquakes (1) which can damage houses (1). • Volcanic eruptions can cause landslides (1) which can cause injury / death (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(h)	**AO3 (4 marks) AO4 (4 marks)** **Note to examiners:** There was a minor error in the key on Figure 3c, an erratum was read out to candidates at the start of the exam and individually included with the Resource booklet. The sequence in the resource booklet reads: <5, 5-24, 24-50, 50> It should read: <5, 5-24, 25-50, **>**50 **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing why some countries are more vulnerable to the impact of natural hazards. **AO3** • There are a range of primary/immediate and secondary/long term impacts of earthquakes which can vary due to the size and intensity of the earthquake as well as the location. But these are likely to occur at plate margins (with the exception of hot spots). • A countries economic development may allow it to reduce people's vulnerability to the impact of natural hazards. For example, in California many buildings are reinforced so they are less likely to collapse during an earthquake events, which should lead to fewer deaths. • Developing countries that are located on plate margins may not have the capability of preparing or preventing hazard events from occurring to the same extent as developed countries. • In many cases the physical factors are also significant for example in Mexico City the risk of liquefaction due to the soils the city is built on makes it more vulnerable to severe damage if an earthquake occurs. **AO4** • Fig 3c shows a map of average annual number people killed by seismic hazards. It indicated how there are concentrations of where people are killed by seismic hazards. • Figure 3c shows how the average number of deaths from seismic

	hazards follow the pattern of where plate margins are located, with concentrations in Central American and North India/around the Himalayas. • Figure 3d shows how countries with earthquake events with similar magnitude can have very different impacts in terms of the number of deaths and injuries. • Figure 3d shows information about the economic development of the country and the earthquake event from the USA has a much lower death and injury record than the events in Indonesia and Mexico.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	**Answer**	**Mark**

Question 3

Question number	Answer	Mark
3(a)	**AO1 (1 mark)** **D** volcanic eruption. (1). The answer cannot be A, B or C as these are hazards created by human intervention.	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **B** warm sea surface temperatures (1). The answer cannot be A, C or D as these are not features associated with the development of cyclones.	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following: • Saffir-Simpson scale (1)	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark) / AO2 (1 mark)** Award 1 mark for an initial point, and a further mark for explanation or development. • Force created by the Earth's rotation (1) that deflects moving objects at the Earth's surface (1). • The deflection of the air moving along the surface of the Earth (1) rightward in the Northern Hemisphere / leftward in the Southern Hemisphere (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (3 mark)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. • Constructive plate margins form due to tectonic plate moving apart (1) this occurs due to hot magma under the earth's crust rising due to convection currents (1) as the molten material rises it forms new land (1). • Divergent plate margins form where plates move away from each other (1) this occurs due to ridge push/slab pull (1) allowing magma to rise to fill the gap and solidify (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(d)	**AO2 (2 marks) / AO3 (2 marks)** Award 1 mark (AO2) for identification of a short-term impact and a further mark (AO3) for further development shown on Figure 3a. Candidates should respond with two different factors, if responses just list two types of infrastructure damage limit to 1 mark max. • Infrastructure such as buildings and roads are destroyed (1) this may result in injury or death to the population (1). • Water supplies maybe damaged (1) which leads to the contamination of water and disease (1). • Need for medical supplies and aid (1) to cope with injuries caused by the earthquake (1). • Emergency relief (1) looking for trapped people (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award 1 mark for one of the following. • Focus (1)	**(1)**

Question number	Answer	Mark
3(f)	**AO1 / AO2 (4 marks)** Award 1 mark for each initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks, or up to 2 marks for different initial points and a further mark for extension of these points up to a maximum of 4 marks. Responses could focus on explaining one particular impact or focus on more than one impact: • Road and rail links may be destroyed (1) meaning it is difficult to get longer term assistance to areas that are affected (1). This leads to a negative effect on economic growth (1) because countries take a long time to recover from the initial short-term effects (1). • Power cables may be destroyed (1) which may limit communication to coordinate responses (1). This can lead to more deaths if those injured are not treated (1) and can slow down the long term recovery of the area (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
3(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. **AO3** • There are a wide variety of reasons why people live around volcanoes. • Tradition can play an important role for some cultures. • Volcanoes provide a valuable source of income. The income gained can help offset some of the risk that people face. • Many people regard the risk from the volcano as a natural part of life. **AO4** • Figure 3c shows subsistence farmers working in the shadow of the Volcano. • Figure 3c shows how in some countries Volcanoes provide a source of energy. • Figure 3d shows how rich countries are able to manage the risk of volcanoes through prediction and prevention. • Figure 3d shows how volcanoes provide a source of income at a national, local and individual level. • Figure 3d suggest for some people moving away from volcanoes is not an option due to their traditions or financial position.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

3(a)	**AO1 (1 mark)** C Answer cannot be A (feature of a volcano), B (feature of a volcano), D (feature of a tropical storm)	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** B Answer cannot be A (definition of eye wall), C (definition of air pressure), D (definition of eye).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Deaths (1) • Injury (1) • Damaged buildings (1) • Closed airports (1) • Choking from ash/gas (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for development (AO2) up to a maximum of two marks. • Risk assessments can determine the probability and scale of an event occurring (1) which can encourage governments to invest in earthquake proof buildings (1). • Risk assessments can identify population at most risk (1) which can ensure response plans take account of most vulnerable groups (e.g. elderly/young) (1) which reduces risk of injury/death (1). • Risk assessments determine location of areas most at risk from tsunami wave (1) which show local governments where to build flood protection (1) to reduce social/economic impacts (1).	

	Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (3 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • The Richter scale (1) measures the magnitude of an earthquake (1) on a logarithmic scale (1). • The Richter scale (1) measures the amount of energy released by the earthquake (1) using a seismograph (1). • The Mercalli scale (1) looks at the impacts of an earthquake (1) on a increasing scale from 1-12 (1). • The Moment Magnitude Scale (1) measures the energy released by an earthquake (1) based on the amount of rock movement along the fault (1). • Seismometers (1) measure the energy from the earthquake (1) when a weight moves due to vibrations (1) Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(d)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for the identification of a characteristic of a tropical cyclone and a further mark for explanation (AO2) up to a maximum of two marks each. • Areas of warm ocean/water (1) cause air to rise/areas of low pressure (1). • There are thunderstorms (1) because the clouds are tall in height (1). • There is rainfall (1) because of thunderstorms being present (1). • The eye is calm (1) because the winds are deflected by Coriolis force (1). • The eye wall is most violent (1) because of the strong winds created (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award one mark for the following: • Crater (1)	**(1)**

Question number	Answer	Mark
3(f)	**AO1 (2 mark)/AO2 (2 mark)** Award 1 mark (AO1) for the identification of a physical and social factor and a further mark for explanation (AO2) up to a maximum of two marks each. **Physical:** • Being an area of low-lying land (1) makes the likelihood of flooding (from storm surges) increase (1) • Being located between the tropics (1) increases vulnerability as the sea is warm enough for tropical cyclones to form (1) • Being located on the coastline (1) as this is where cyclones will make landfall and be at their strongest (1) **Social:** • Having a population with lots of very elderly people (1) increases vulnerability as they need help to evacuate (1) • Having a very young population (1) can increase vulnerability as they need help to evacuate (1). • Having a poorly educated population (1) means they will not know what to do/where to go when a cyclone hits (1). • Not planning for evacuation (1) can increase the risk of injury/death (1) Accept any other appropriate response.	**(4)**
Question number	Answer	**Mark**
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and	

	candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the significance of different plate margins in causing hazards. Candidates will need to be able to identify the different scale of hazards caused at different plate margins and consider the most dangerous plate margin to live near. **AO3** • Volcanic eruptions at divergent plate margins are often low explosivity, with mainly lava eruptions. The lava is often runny and flows quickly. However, these shield volcano eruptions are often more frequent. • Volcanic eruptions at convergent plate margins are often more explosive. Where composite volcanoes form resulting in eruptions which include pyroclastic flows, lahars, lava, volcanic bombs. These eruptions are often less frequent. • Earthquakes at convergent plate margins are often quite high magnitude due to 'stuck/slip' faults. These lead of high amounts of pressure building between earthquakes making the magnitude bigger when the fault ruptures. • Earthquakes at transform plate margins are often high magnitude due to the 'stuck/slip' nature of the faults. • Earthquakes at divergent plate margins are often low magnitude resulting in little/no damage to human property/life. **AO4** • Iceland is located on a divergent plate margin resulting in low explosivity eruption. • Nepal is located on a convergent plate margin between two continental plates and experienced a 7.8 magnitude earthquake. • The Tonga eruption was fairly explosive (VEI 5) due to it being at a convergent plate margin. • The New Zealand earthquake had a magnitude of 7.8 as its located on both transform and convergent plate margins.	
		(8)

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** **A** (conservative) Answer cannot be B (shield volcanoes), C (composite volcanoes), D (hotspot/shield volcanoes)	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **D** (Saffir-Simpson Scale) Answer cannot be A (earthquakes), B (earthquakes), C (earthquakes).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Eye (1) • Eye wall (1) • Spiralling / rotating clouds (1) • Banks of thunderstorms / heavy rainfall (1) • Strong winds (1) • Low pressure (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO2 (2 marks)** Award 1 mark for initial explanation and a further mark for development up to a maximum of two marks. • Tropical storms source of energy comes from warm ocean water (1) as this fuels high evaporation rates(1). • On land tropical storms lose their energy source (1) which means their energy dissipates shortly after landfall (1). • On land there is increased friction (1) which alters the flow of air (1). Accept any other appropriate response.	(2)

Question number	Answer	Mark
3(c)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for identifying a preparation strategy and a further mark explanation (AO2) up to a maximum of two marks each. • Evacuation routes (1) are often clearly sign posted making people aware of where to go (1). • Many people have access to mobile phones (1) which makes it easy to warn everyone (1). • Earthquake resistant buildings (1) meaning buildings are less likely to collapse (1). • People are likely to have 'earthquake kits' (1) meaning they often have food and water supplies prepared (1). • People living near plate boundaries are more aware of risk (1) so have emergency supplies prepared (1). Accept any other appropriate response.	(4)

Question number	Answer	Mark
3(d)	**AO2 (3 marks)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Places near steep slopes (1) are more vulnerable as there is greater risk of landslides / lahars (1) increasing damage (1). • Clayey soil (1) increases risk of liquefaction (1) which damages buildings (1). • Coastal areas (1) are more at risk from tsunamis / tropical cyclones (1) increasing frequency of hazardous events (1). • Time of year (1) can cause more death (1) if it's very hot or very cold when people are homeless (1). • Time of day (1) can increase injury/death (1) as at night people are in bed and less ready to escape (1). • Magnitude / size / strength (1) can increase risk as the winds / ground shaking are stronger (1) causing more damage to infrastructure (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award one mark for the following: • Lava (flow) (1)	(1)

Question number	Answer	Mark
3(f)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a reason based on specific locational evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • Volcanoes are mainly found along the Pacific Plate boundary (1) because tectonic plate is being destroyed (1). • Some volcanoes are found in the middle of the Pacific Plate forming hotspots (1) because this area of crust is thin (1). • Some volcanoes are found away from the African Plate boundary (1) because plumes of hot magma rise through weak points on the Earth's crust (1). • Most volcanoes are found around the Pacific Ocean (1) because of destructive/convergent plate boundaries/margins (1). • There volcanoes found around Iceland (1) because they are formed at constructive/divergent plate boundaries/margins (1). • Volcanoes are found in Hawaii (1) as a magma plume sits beneath the Pacific Plate (1). **Do not credit 'close to plate boundary' without specific locational reference to evidence shown on the resource.** Accept any other appropriate response.	(4)

Question number	Answer	Mark
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the significance of different types of impacts volcanic eruptions can have on the environment. Candidates will need to be able to identify the different types of impacts and consider the most severe impact for the environment. **AO3** • Shorter term impacts often last for hours, days, weeks. • Longer term impacts often last for months, years, decades. • A range of volcanic hazards can cause damage to the environment. Lava flows, lahars, pyroclastic flows can destroy vegetation and pollute rivers, lakes and waterways. • Ash and gas can make the air dangerous to breathe leading to the death of animals. • Animals can also ingest ash that has landed on vegetation they eat and water they drink. • In large eruptions ash can cause a drop in temperature as it blocks out solar radiation. This also increases the amount of sulfate aerosols in the atmosphere which absorb solar radiation radiated from the Earth's surface increasing the cooling effect. • After the initial destruction the environment is able to rebalance, and the ash is a good fertiliser for the soil. **AO4** • Figure 3c shows a large area of vegetation was lost directly around the Mount Mayon. • Figure 3c shows there is a large area of green on the south flank of the volcano. • Figure 3c shows 29 rivers were silted up with ash reducing the water quality. • Figure 3c shows animals are impacted as a result of polluted rivers/swamps. • Figure 3c shows ash covers everything for large areas after the eruption. • Figure 3c shows 7,100 hectares of agricultural land was destroyed. • Figure 3c shows the area highly prone to ashfall was over 7km in width. • Figure 3c shows the areas more highly prone to ashfall were to the west, south and north of the volcano.	(8)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** **D** (strong winds) Answer cannot be A (earthquake), B (earthquake), C (earthquake)	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **B** (hot plumes of magma break through crust away from plate boundaries) Answer cannot be A (super volcano), C (shield), D (composite).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Volcanic Explosivity Index / VEI (1)	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for development (AO2) up to a maximum of two marks. • Volcanoes need a source of magma (1) which is not present as two plates move past each other (1). • Plates slide past each other (1) which means neither tectonic plate is destroyed (1). • Volcanoes occur where a tectonic plate is destroyed (1) which does not happen when two plates slide past each other (in opposite directions) (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for identifying a strategy/factor and a further mark explanation (AO2) up to a maximum of two marks each. • Emergency services (are well trained) (1) which means they rescue people (trapped) quickly (1). • Countries do not need to rely on international aid (1) to provide essential supplies (1). • The most common type of shelter (provided are buildings/arenas) (1) which provide good protection from the elements/weather (1). • Good communication (due to having mobile phones/radios) (1) can make it easier to co-ordinate the emergency response (1). Accept any other appropriate response.	(4)

Question number	Answer	Mark
3(d)	**AO2 (3 mark)** Award 1 mark for a factor and 2 marks for further explanation up to a maximum of 3 marks. • Some areas have high quality building infrastructure (1) which reduces the numbers of building collapse (1) which reduces risk of death/injury (1). • Cheaper to live (1) even though people are aware of the risk (1) they have no choice but to stay (1). • People may be aware of the risk but choose to live there anyway (1) as they are close to their family (1) which improves peoples mental health (1). • Being educated (1) means people are aware of the risk (1) which means people have earthquake kits prepared (1). • People may not be able to afford to move away (1) because unemployment rates are high (1) and they worry they will not find a job elsewhere (1). Accept any other appropriate response.	(3)

Question number	Answer	Mark
3(e)	**AO3 (1 mark)** Award one mark for the following: • Ash (cloud) (1)	(1)

Question number	Answer	Mark
3(f)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for the identification of a factor based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • Tropical cyclones are found near the equator (in areas of warm ocean water) (1) because this fuels high evaporation rates (1). • Tropical cyclones are found between the Tropics (1) as the water is 27°C (1). • There are no tropical cyclones directly at the equator (1) because there is no Coriolis force (1). • All tropical cyclones travel in the same direction (from east to west) (1) as a result of the trade winds (1). • All tropical cyclones begin in the middle of oceans (1) because this supplies their energy (1). • All tropical cyclones do not remain where they form (1) as they follow in the direction of prevailing wind/ocean currents (1). • Tropical cyclones are found in the Caribbean (1) as the water is 27°C (1). **Do not credit direct mirrors.** Accept any other appropriate response.	(4)

Question number	Answer	Mark
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the significance of different types of impacts tropical cyclones can have on the people. Candidates will need to be able to identify the different types of impacts and consider the most severe impact for people. **AO3** • Shorter term impacts often last for hours, days, weeks. • Longer term impacts often last for months, years, decades.	(8)

	• A range of tropical storm hazards can have impacts on people. High winds, heavy rainfall, storm surges can cause death and injury. • High winds are responsible for most of the destruction of buildings as most houses are well built in the USA meaning flooding only causes damage to buildings. • Storm surges are the deadliest hazard from tropical storms as there is no escape for people who remain at ground level in an area hit by a tropical storm. • Economic losses have a significant impact on people as they may lose their job(s) and experience increases insurance premiums. • The shorter-term impacts are often considered more severe for people as there are high levels of emotional distress/shock at what has happened. • The economic costs are usually severe as the USA is a developed country and has advanced infrastructure. **AO4** • Figure 3c shows 40% of businesses closed permanently after being affected by Hurricane Irma. • Figure 3c shows large numbers of people had to queue for essentials such as gas. • Figure 3c shows large areas were flooded as a result of Hurricane Irma. • Figure 3c shows roads were blocked by flooding. • Figure 3c shows people had to walk through flood water to escape. • Figure 3c shows buildings were destroyed by Hurricane Irma.	

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant

		understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question 3

Question number	Answer	Mark
3(a)(i)	**AO1 (1 mark)** **A** (crater) Answer cannot be B (earthquake), C (cyclone), D (earthquake)	**(1)**

Question number	Answer	Mark
3(a)(ii)	**AO1 (1 mark)** **B** (pyroclastic flow) Answer cannot be A (benefit of volcano), C (cyclone hazard), D (cyclone formation).	**(1)**

Question number	Answer	Mark
3(a)(iii)	**AO2 (2 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Volcanoes create fertile land (1) which makes it good for farming (1). • Volcanoes attract tourists (1) which create jobs for local people (1). • Precious metals/minerals (1) are found in volcanic areas which can be mined for profit (1). • Some people do not think it will erupt in their life time (1) and so benefits outweigh the risks (1). • Some people are too poor and cannot afford to relocate (1) meaning they have no choice (1). • Some people trust in the monitoring / preparation / planning strategies put in place by their government (1) making them feel safe and protected (1). • Some people have lived there all their lives (1) and do not want to leave family/friends (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(b)	**AO1 (1 mark)** Award one mark for a suitable definition of earthquake risk assessment: • Process of identifying the chance of an earthquake happening (1). • An examination of anything that may cause harm (1). • A way to understand threat to avoid dangerous situations (1). • Identifying potential vulnerability from an earthquake (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a physical characteristic based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • The volcano has very steep sides (1) which makes landslides more likely which increase risks (1). • The volcano is snowcapped (1) which will melt during an eruption and cause flooding (1). • Tall volcanoes are often composite (1) which erupt more violently (1). • There is a lake at the base of the volcano (1) which has the potential to form a tsunami wave (1). • Close proximity to a volcano (1) which increases the risk of damage from ash/pyroclastic flow (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO3 (1 mark)** Award one mark for the following: • 30°N to 30°S (1)	**(1)**

Question number	Answer	Mark
3(e)	**AO2 (3 marks)** Award 1 mark for identification of an impact on people and 2 marks for further explanation up to a maximum of 3 marks. • Storm surges can drown people (1) causing emotional distress for family members (1) affecting peoples mental health (1). • Strong winds can injure people (1) which means they cannot work (1) leading to increases in government support (1). • Cyclones can destroy buildings (1) making people homeless (1) and needing to leave the area (1). • Buildings are damaged (1) causes businesses to close (1) meaning people lose their jobs (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
3(f)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for an initial reason and a further mark for explanation (AO2) up to a maximum of two marks each. Ocean temperatures: • Tropical cyclones need warm oceans to form (1) as this heat drives energy into the storm (1). • Tropical cyclones need oceans about 26.5°C (1) as this increase evaporation which transfers heat energy into atmosphere (1). Wind shear: • Wind shear needs to be weak (1) so thunderstorms are not ripped apart before a cyclone can form (1). • Cyclones need low wind shear (1) to allow storm clouds to rise vertically to high levels (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the effectiveness of earthquake preparation strategies and make judgements regarding to overall effectiveness or deciding which aspects are more effective than others. Candidates will need to consider the strategies and their contribution to altering deaths. **AO3** • Earthquake preparedness are a set of measures taken to minimise the effects of an earthquakes. • Preparation strategies include: warning, evacuation plans/routes, building design, GIS, remote sensing. • Strategies are taken at different levels for example households can nail furniture to walls to prevent it falling to reduce risk. • Governments can support education to increase awareness of how to respond when an earthquake occurs. • Schools and business can run earthquake drills to ensure people know what to do. • Preparation can help to reduce impacts on people. • Preparation can help to reduce economic costs. • Some may say prevention is better than reaction and so is more effective. • Level of a country's development can influence how well they cope. **AO4** • Figure 3c shows the people dying from fires after earthquakes has reduced by 87.1%. • Figure 3c shows the highest number of deaths was in 1923 suggesting deaths are decreasing. • Figure 3c shows the percentage of people killed by building collapse has reduced by 6.1%. • Figure 3c shows measure to ensure safety in the home during an earthquakes. • Figure 3c shows a leaflet providing guidance on preparation.	**(8)**

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

3(a)	**AO1 (1 mark)** **B** (tectonic plates moving towards each other) Answer cannot be A (divergent), C (transform), D (incorrect)	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **D** (vent) Answer cannot be A (earthquake feature), B (cyclone feature), C (earthquake feature).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Lava flow (1) • Pyroclastic flow (1) • Lahar (1) • Ash (cloud) (1) • Volcanic/lava bomb (1) • Earthquake (1) • Tsunami (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO2 (2 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Plumes (of very hot) magma rise (1) and melt area of thin oceanic crust (1). • Magma plumes are stationary (1) melting weak areas of (oceanic) crust (as they move over it) (1). • The magma plume (1) causes thinning of the crust (1).	

	Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a impact based on evidence from resources and a further mark for explanation (AO2) up to a maximum of two marks each. • The capital city Plymouth was abandoned (1) resulting in lots of jobs being lost (1). • Two thirds/most/over half/large area of the island was made an exclusion zone (1) permanently displacing the population (1). • The north of the islands become more densely populated (1) increasing pressure on services (1). • The airport was abandoned (1) making it hard for people to migrate/unable to visit family (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO3 (1 mark)** Award one mark for the following: • USA / US / America (1) • Cuba (1)	**(1)**

Question number	Answer	Mark
3(e)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the initial reason and a further mark explanation (AO2) up to a maximum of two marks each. • Wind shear needs to be low (1) to allow storm clouds to rise vertically to high levels (1). • A Coriolis force is required (1) to deflect the air to create the rotation (1). • Low air pressure (1) which causes the air to rise to form clouds (1). • High sea temperatures (of at least 27°C) (1) to drive energy into the storm (1). Accept any other appropriate response. **No credit for 'high temperatures' on its own, must have reference to water/sea/ocean for credit.**	**(4)**

Question number	Answer	Mark
3(f)	**AO2 (3 marks)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • They may be close to family/friends (1) who provide emotional support (1) moving away would increase isolation (1). • High levels of education (1) so people know what to do (1) which reduces their perception of risk (1). • Low levels of education (1) meaning people are unaware of the dangers (1) and see no reason to move (1). • Government investment in early warning systems (1) ensures people have enough time to evacuate (1) making them feel safer (1). • Poverty (1) which means people are forced to stay in the area (1) despite the risk they face (1). Accept any other appropriate response. **No credit for stating 'advantages outweigh disadvantages'**	**(3)**

Question number	Answer	Mark
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the influence of physical causes of vulnerability and make judgements regarding to which physical factor is most significant increasing risk. **AO3** • Vulnerability is the potential to be harmed. • Physical, social and economic factors can increase/decrease a locations level of vulnerability. • The characteristics of the earthquake can increase vulnerability if the magnitude is high and the depth of focus is shallow. • The proximity of the epicentre to built up areas can influence a locations vulnerability. • The hazards caused by the earthquake can increase vulnerability if secondary hazards like tsunamis and landslides occur. • The time of day and season can influence vulnerability if its very hot or very cold people displaced are likely to become ill if they are living outside. • Physical vulnerability factors are not controlled by people. • People can adapt to reduce social and economic vulnerabilities to a greater extent. • The evidence suggest physical vulnerability factors are not the greatest influence on impacts. **AO4** • Figure 3c shows the physical factors for the Japan earthquake are all worse than Morocco. • Figure 3c shows the social impacts are less severe in Japan. • Figure 3c shows that the economic impacts are greatest in Japan. • Figure 3c shows that Morocco had the more severe social impacts • Figure 3c shows that Morocco had the smallest economic impacts • Figure 3c shows Japan experienced a tsunami as a result of the earthquake.	
		(8)

Question	Answer

number		
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

QUESTION 4

Question number	Answer	Mark

3(a)	**AO1 (1 mark)** **C** (Richter scale) Answer cannot be A (wind), B (cloud cover), D (cyclone)	**(1)**

Question number	Answer	Mark
3(b)(i)	**AO1 (1 mark)** **B** (the point inside the earth's crust where the earthquake starts) Answer cannot be A (continental plate), C (epicentre), D (oceanic plate).	**(1)**

Question number	Answer	Mark
3(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Ground shaking (1) • Liquefaction (1) • Landslide (1) • Tsunami (1) • Flooding (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
3(b)(iii)	**AO2 (2 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Trees can be uprooted (1) which can increase soil erosion (1). • Salt intrusion (from tsunamis) (1) can kill vegetation in flooded fields (1). • Freshwater (rivers) can be polluted by salt (1) killing freshwater organisms (1). • Caves may collapse (1) which unbalances the ecosystem (1).	

	• Tsunami waves can damage/destroy coral reef/mangroves (1) reducing biodiversity/destroys the habitat (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
3(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a reason based on evidence from resources and a further mark for explanation (AO2) up to a maximum of two marks each. • People are told to secure their furniture to the wall to prepare in advance (1) (for an earthquake) which will reduce injury/death (1). • Awareness of drop, cover, hold ensuring people know what to do (1) (when an earthquake) occurs reducing injury (1). • People are told to have emergency supplies means they are prepared if supplies are interrupted (1) reducing malnutrition/panic buying (1). • There is clear evidence of planning, having evacuation routes (1) which reduces the number of people exposed to risks (from earthquakes) (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
3(d)	**AO3 (1 mark)** Award one mark for the following: • Transform / conservative (1)	**(1)**

Question number	Answer	Mark
3(e)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the initial feature and a further mark for development (AO2) up to a maximum of two marks each. • Volcanoes at destructive plate boundaries are very tall (1) as the lava is very stickly and does not flow very far (1). • Some volcanoes are made up of layers of ash and lava (1) as eruptions are often explosive (1).	

	• Volcanoes at constructive plate boundaries erupt infrequently (1) as the vents are often blocked by cooled magma (1). • Some volcanoes erupt violently (1) because the magma is very viscous (1). Accept any other appropriate response, including mirrors of above suggestions.	**(4)**

Question number	Answer	Mark
3(f)	**AO2 (3 marks)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • The ash from previous eruptions (1) makes the soil fertile (1) increasing crop growth (1). • Volcanoes attract tourists (1) which generates jobs (for people living there) (1) which increases standard of living (1). • Geothermal energy can be harnessed/produced (1) which can provide cheaper energy (for locals) (1) reducing need for imports (1). • Minerals are contained in the lava which can be mined (1) which generates an income (1) which increases GDP/county's economy (1). • People are protected from flooding (1) as volcanic rocks absorb water (1) reducing surface runoff (into rivers) (1). • Poverty/not enough money/low income (1) due to low paying jobs (1) means there is no choice/can't more (1). Accept any other appropriate response. **No credit for stating advantages outweigh disadvantages**	**(3)**

Question number	Answer	Mark
3(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant	

	material not suggested below must also be credited. This question is about analysing the influence of physical causes of vulnerability and make judgements regarding to which physical factor is most significant increasing risk. **AO3** • Vulnerability is the potential to be harmed. • Physical, social and economic factors can increase/decrease a locations level of vulnerability. • The wind strength of a tropical cyclone can increase a country's vulnerability. • Secondary hazards like landslides can increase vulnerability. • The height of the storm surge can influence a places vulnerability. • Physical vulnerability factors are not controlled by people. • People can adapt to reduce social and economic vulnerabilities to a greater extent. • The evidence suggests physical vulnerability factors are not always the greatest influence on severity of impacts. • Social impacts are often higher in developing / emerging countries. • Economic impacts are often higher in developed countries. **AO4** • Figure 3c shows the storm surge was worse for Japan. • Figure 3c shows the wind speed was higher for the Philippines. • Figure 3c shows the social impacts are mainly less severe in Japan. • Figure 3c shows that the economic impacts are greatest in Japan. • Figure 3c shows that Philippines had the more severe social impacts. • Figure 3c shows that Philippines had the smallest economic impacts.	
		(8)

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the

		argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

QUESTION 4

Question number	Answer	Mark

6(a)(i)	**AO3 (1 mark)** A systematic (1)	**(1)**
	B, C and D are all incorrect	

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** This will depend on the sampling method identified e.g. systematic Poor representation of overall investigation (1) Time constraints (1) Can be biased (1) Can be under representative / gaps in data collection (1) Unreliable (1) Inaccurate (1) Accept any other appropriate response	**(1)**

Question number	Answer	Mark
6(a)(iii)	**AO4 (2 mark)** Correct method of working, showing addition, and then division by 5 (1) and one mark for the correct mean, written to one decimal place, 36.1 (1)	**(2)**

Question number	Answer	Mark
6(a)(iv)	**AO4 (2 mark)** Award 1 mark for each correct bar. To be awarded the mark for the first bar, line must be drawn between 50-51. The second bar needs to be right on the line. Shading is not required.	**(2)**

Question number	Answer	Mark
6(a)(v)	**AO4 (1 mark)** One mark for an 'x' in box 5	**(1)**

Question number	Answer	Mark
6(a)(vi)	**AO3 (2 mark)** Award 1 mark for an initial reason, and a further mark for extension of this point. E.g. Human error with the equipment used to measure wind speed (1) which meant that the sediment appeared bigger than it really was (1) measurement was taken in a sheltered area (1) which meant that the wind speed recording was much lower (1) Variation in wind speed over time / readings were not all taken at the same time (1) which led to a much lower result for site 5 (1) Accept any other appropriate response	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (3 mark)** Award 1 mark for identification of primary data method and award 2 further marks for development of explanation Candidates could identify a number of sources of primary data to help them extend their study including: Rain – the use of a rain gauge (1) to collect data on mm of rainfall over a period of time (1) data can be plotted to explore patterns (1) Temperature – the use of a thermometer (1) to measure temperature (1) plotted data against wind speed to explore patterns over a period of time (1) Air pressure – the use of a barometer (1) to measure air pressure (1) plotted against wind speed to explore patterns over a period of time (1) Accept any other appropriate response	**(3)**

Question number	Answer indicative content
6(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **AO3** • Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the hazardous environment where the fieldwork was carried out. • Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected that might have affected whether they were able to answer their enquiry questions. • Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or the equipment chosen. **AO4** • There is evidence of using different skills and techniques to measure changes in a hazardous environment. • There is evidence of using different skills and techniques to reach conclusions about changes occurring in a hazardous environment. • There is evidence of using different skills and techniques to evaluate conclusions about changes occurring in a hazardous environment. • There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student. This question is about the candidates making a judgement of the success of their data analysis techniques. Candidates are expected to make a judgement. Candidates should identify strengths, weaknesses, alternatives ways of analysing the data In this response there would be an expectation for the candidates to evaluate a number of different data analysis techniques. Candidates should look to identify the appropriateness of data analysis techniques.

	A view should be given on how successful or unsuccessful the data analysis techniques were and how they could be improved to help candidates understand the data collected more effectively For level 2 responses the candidate response will need to link to the evaluation to their study directly. For level 3 response there should be a greater depth of evaluation. Recognition of whether or not the data analysis was less successful because of the way it was designed/technique used. How far data-analysis helped draw a significant conclusion for the study An evaluation of how far the outcomes can be trusted (or repeated to obtain the same results).

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)(i)

AO3 (1 mark)

Award 1 mark for any reasonable risk in the context of this environment:

- (Falling over in) strong winds (1)
- Exposure / sunburn (1)
- Slips / trips / bumps (1)
- An extreme weather event (1)
- Heavy rain / flooding (1)

	• Falling masonry / building collapse (1) Accept any other appropriate response. **Reject inaccurate measurements as not part of risk assessment. Also reject earthquake risks.**	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** Award 1 mark for any reasonable risk in the context of what was identified in (5ai): • Avoid exposed locations / out in the open (1) • Collecting data once the storm has died down (1) • Use secondary data (1) • Checking local requirements / plans etc (1) • Waking with care (1) • Working in groups (1) • Wearing sunscreen / suntan lotion (1) • Staying away from a storm (1) • Using a weather forecast (1) • Remote collection of weather data (1) Accept any other appropriate response. **Reject approaches that do not match (5ai).** **Reject to stay indoors as weather data cannot be collected indoors.**	**(1)**

Question number	Answer	Mark
6(a)(iii)	**AO4 (2 marks)** Award 1 mark for: Correct method of working, showing addition, e.g. 241 **or** 60.0+46.0+55.0+70.0+10.0 (1)	

	Correct mean, written to one decimal place, 48.2 (1). **Reject answer to 2dp, i.e. 48.20**	**(2)**

Question number	Answer	Mark
6(a)(iv)	**AO4 (2 marks)** Award 1 mark for each correct bar. For each bar the lines need to be drawn accurately – right on the correct line. **Site 1=60** **Site 4=70** Note width of bars doesn't matter. There is no need for bars to be shaded.	**(2)**

Question number	Answer	Mark
6(a)(v)	**AO3 (2 mark)** Award 1 mark for an initial reason, and a further mark for extension of this point. E.g. • The equipment used to measure wind speed (1) didn't measure accurately (1) so the wind speed was lower than it should have been (1). • The measurement was taken in a sheltered area (1) which meant that the wind speed recording was much lower (1). • Variation in wind speed over time / readings were not all taken at the same time (1) which led to a much lower result for site 5 (1). • Site 5 was in the eye of the storm (1) which meant that the speed was lower (1). • Anemometer / wind speed indicator was incorrectly calibrated (1) leading to an unreliable measurement (1). • It was ta the end of the hazardous event / storm (1) therefore we would expect to see a change in the pattern of wind speeds (1).	

	Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO4 (4 mark)** Award marks for a description of the technique (1) and a further mark for a developed description (1) Quantitative • Sites could have wind speed measured at different times before (1) to measure the time taken for the storm to build up (1) • Sites could have wind speed measured at different times after the storm (1) to measure time taken for the storm to dissipate (1) Qualitative • Students could observe the wind speed using cameras (1) and assess the damage caused by the storm (1) Accept any other appropriate response	**(4)**

Question number	Answer indicative content
6(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. **AO3** • Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected that might have affected whether they were able to answer their enquiry questions. • Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or the equipment chosen. • Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the environment where the fieldwork was carried out. **AO4** • There is evidence of using different skills and techniques to measure weather changes in a location – both design and techniques. • There is evidence of using different skills and techniques to reach conclusions about changes occurring as a result of a weather diary. • There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student. If the enquiry question isn't present do not penalise. • There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student • In this response there would be an expectation for the students to evaluate a number of different data collection techniques.

	• This should an evaluation of primary and secondary data as appropriate. • Students should look to identify the appropriateness of data collection techniques. • A view should be given on how successful or unsuccessful the data collection techniques were and how they could be improved to help students gather more effective results. • For level 2 responses the student response will need to link to the evaluation to their study directly. • For level 3 response there should be a greater range or depth of techniques evaluated. • AO3 – recognition of whether or not the data collection was less successful because of the way it was designed. • Recognition of any faults in equipment or human error. • How far data-collection methods used produced reliable results • An evaluation of how far the outcomes can be trusted (or repeated to obtain the same results).

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

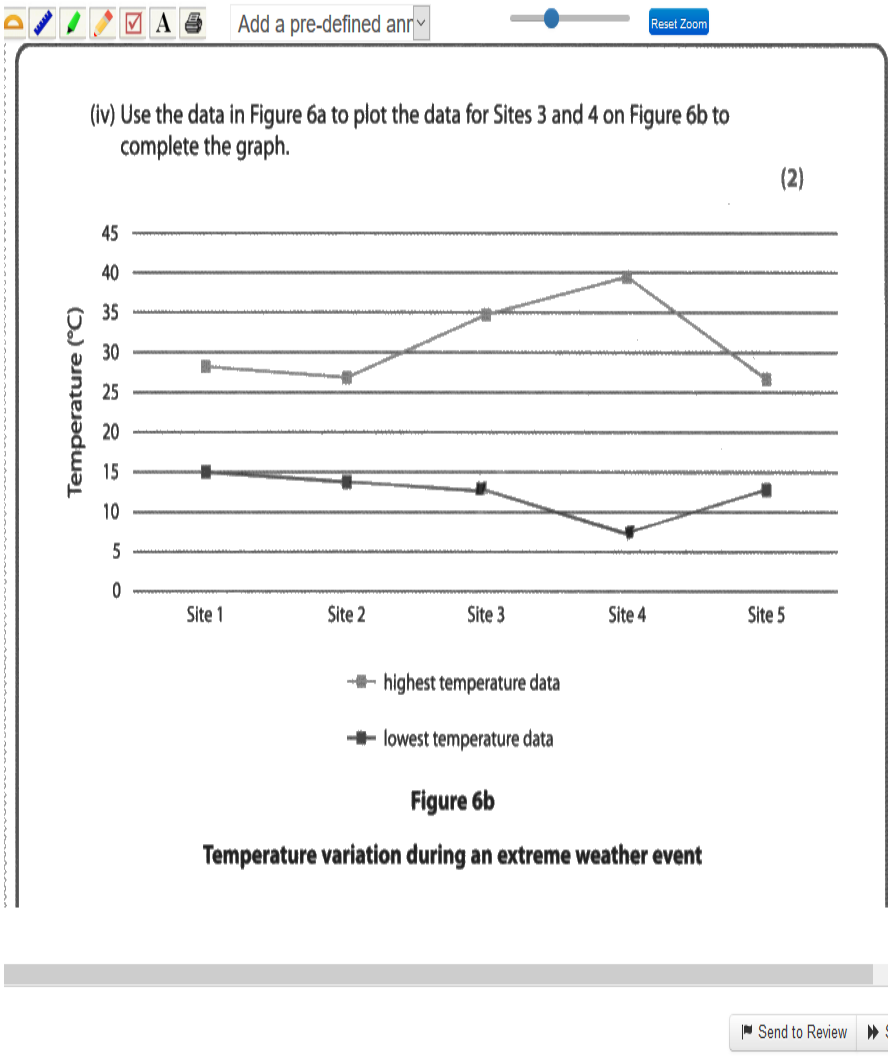
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(ai)	**AO3 (1 mark)** Students could use data from a previous study in the same area (1). Alternatives could include: • (GIS) maps • Archive materials from previous studies • Historical data • Data collected from the internet • Met office data • Archive video footage Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(aii)	**AO3 (1 mark)** Award one mark for a suitable disadvantage. • The data could be inaccurate/bias (1). • The data could be from a different location (1). • They may not have collected the data over the same time period (1). In this response candidates must relate the answer for 6aii to the response given in 6ai. If candidates don't put in a response for 5ai and then state a generic disadvantage allow mark. Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(aiii)	**AO4 (2 marks)** Award 1 mark for working and 1 mark for correct answer to one decimal place 28.2+27.1+34.8=39.5+26.8=156.4/5 31.3	**(2)**

Question number	Answer	Mark
6(aiv)	**AO4 (2 marks)** Candidates will need to plot all points correctly. 1 mark for correctly plotted points. 1 mark for connecting the points correctly. Plot points are 13.3 and 7.2	**(2)**



Question number	Answer	Mark
6(av)	**AO3 (2 marks)** Award 1 mark for describing an alternative sampling method (1) and 1 mark for further development (1). Stratified – students could use a stratified sampling technique where a proportionate number of observations are taken from each part of an area (1) to reduce the amount of samples needed (1) more likely reflective of the total population (1). Systematic - students could pick the first site at random then pick subsequent sites at a set defined distance (1) this would help ensure that the sampling covered a whole range of temperature changes. (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (4 marks)** Award 1 mark for the initial point (1) and a further mark for further development (1) • Advantage: By using field sketches students can get a quick view of the areas they are working recording key features (1) to support recall later (1). • Advantage: By using field sketches students can highlight features (1) that they want to focus on as part of their study (1). • Disadvantage: Because students are often making sketches quickly, they may not record key features correctly (1) leading to inaccuracies later on (1). • Disadvantage: Because students have different perceptions (1) they may over-exaggerate features (1).	

	Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
6(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates making a judgement of the value of their data presentation techniques in achieving the overall aims of their study. This will depend on what data presentation techniques they used. Candidates are expected to make a judgement on more than one technique. Candidates should identify strengths, weaknesses, and alternative resources which would support them in planning the enquiry.

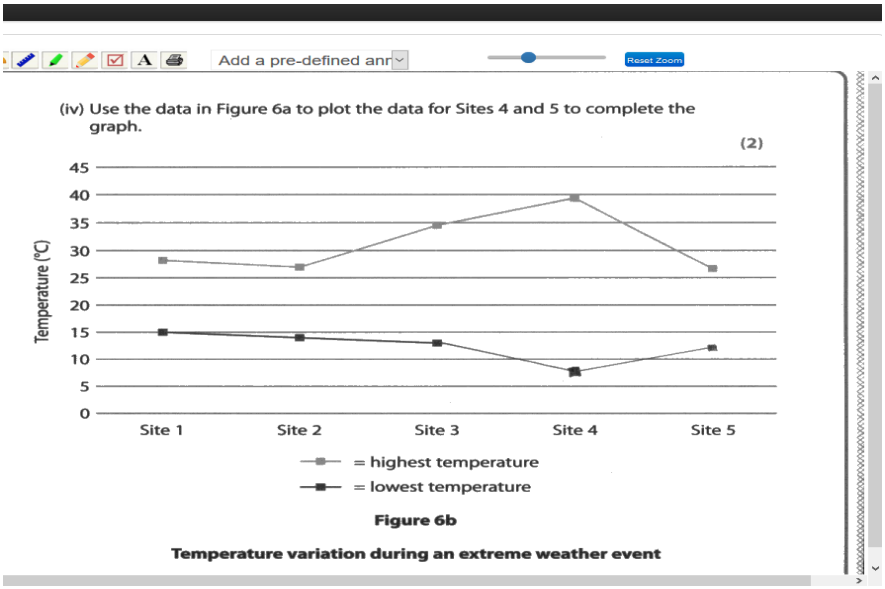
	For level 2 responses candidates will need to link the evaluation to the purpose of the study directly. For level 3 responses there should be a greater depth of evaluation.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(ai)	**AO3 (1 mark)** Award 1 mark for a suitable risk identified. • Students could get hypothermia/heat stroke (1) • Students could get sunburnt (1) • Students could get dehydrated (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(aii)	**AO3 (1 mark)** Award 1 mark for each suitable way to manage risk identified. • Students could have a limited time outside (1). • Teachers could brief students about correct outdoor clothing (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(aiii)	**AO4 (2 marks)** Award 1 mark for working and 1 mark for correct answer to one decimal place. • Add up all the figures peak temperature – low temp - = range • 15.1 + 14.4 + 13.7 + 7.5 + 13.6 = 64.3/5 • Correct answer to 1 decimal place 12.9 Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(aiv)	**AO4 (2 marks)** Candidates will need to plot all points correctly. Low temp Site 4 7.5 Site 5 13.6 1 mark for correctly plotted point for point 4. 1 mark for correctly plotted point for point 5.  **Figure 6b** **Temperature variation during an extreme weather event**	**(2)**

Question number	Answer	Mark
6(av)	**AO3 (2 marks)** Award 1 mark for the initial point (1) and a further mark for further development (1). • Random - students could pick the first site at random to ensure that they reduce bias (1) and therefore don't confirm predetermined theories (1). • Random sampling will ensure choices are not biased (1) so each site had an equal chance of being selected (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (4 marks)** Award 1 mark for advantage or disadvantage identified a further mark for development of each point. Max 2 marks for advantage and 2 marks for disadvantage. • Advantage: By using annotated sketches students can get a quick view of the areas they are working recording key features (1) to support recall later (1). • Advantage: By using field sketches students can highlight features (1) that they want to focus on as part of their study (1). • Disadvantage: Because students have different perceptions (1) they may over-exaggerate features (1). • Disadvantage: Students are only taking a view of their area as they see it (1) candidates sketches may not record everything accurately (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
6(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates making a judgement of the value of their data analysis techniques in achieving the overall aims of their study. This will depend on what data analysis techniques they used. Candidates are expected to make a judgement on more than one technique. Candidates should identify strengths, weaknesses, and alternative techniques which could have been used in their study.

	For level 2 responses candidates will need to link the evaluation to the purpose of the study directly. For level 3 responses there should be a greater depth of evaluation.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)(i)	**AO3 (1 mark)** B Collecting rainfall data every 1km away from the town centre. The answer cannot be A (random sampling), C and D (Doesn't state how sampled).	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** Award 1 mark for a suitable piece of equipment. • Rain gauge (1) • Container with measurements on the side (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(a)(iii)	**AO3 (2 marks)** Award 1 mark for identification of a suitable risk and a further mark for description of why this was important. For example: • Slipping in wet areas (1) as it could lead to damaged equipment. (1) • Getting lost (1) as this could lead to being separated from group. (1) • Busy roads (1) as this could lead to injury (1). • Poor weather conditions (1) resulting in flying debris (1). • Variable weather conditions (1) leading to exposure/heat stroke (1). Accept any other reasonable response.	**(2)**

Question number	Answer indicative content
6(b)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about candidates making a judgement of the data collection methods that have been used and the conclusions made. Candidates may note the strengths or weaknesses of the fieldwork presented in Figures 6a and b. Responses could include: • Comments on the design regarding sampling method used. (Random sampling used which could lead to anomalies) • Comments on the number of data collection sites, relevance of data collected, and the conclusions drawn. (Only two sites) • Comments on the how the conclusions could have been supported by data. • Comments could address if the student has met their aim. (Conclusions are vague) • Comments on how anomalies could have affected the results and therefore the conclusion. • Comments on other data that could have been collected. (Only two sites) • There is no method or detail around the measurement of river velocity so how reliable are the techniques. For level 2 responses candidates will need to link the evaluation to both data collection methods and conclusions. For level 3 responses there should be a greater depth of evaluation recognising the impacts of the design and the data collection methods on the conclusions made.

	Candidates may refer to data presentation methods to link the data collection and conclusions this should be credited. Candidates working at this level must provide an evidenced judgment.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)(i)	**AO3 (1 mark)** A Anemometer (1) The answer cannot be B (measures coverage), C (measures gradient) or D (measure time).	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** Award one mark for a sampling method identified: • Random sampling (1) • Stratified sampling (1) • Systematic sampling (1) • Pragmatic sampling (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(a)(iii)	**AO3 (2 marks)** Award 1 mark for identification of way GIS might be used in a fieldwork environment, and a further mark for description of how it is used. For example: • To look at historical data (1) to be able to compare with primary data (1). • To plot data (1) to be able to analyse changes in different areas (1). Accept any other reasonable response.	**(2)**

Question number	Answer indicative content
6(b)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about candidates making a judgement of the data presentation methods and analysis that have been used to help students draw conclusions. Candidates may note the extent to which the fieldwork presentation and analysis support the conclusions in Figures 6. Responses could include: • Comments could be made on how relevant the conclusions are based on the presentation and analysis methods. • Comments could address the suitability of the data presentation method to help draw conclusions. • Comments could address the suitability of the data table to help draw conclusions. • Comments on how anomalies could have affected the results and therefore the conclusion. • Comments on the accuracy of students recording the data and the effect on conclusions. • Comment on the distribution of site selection for data collection and the impact this could have on conclusions. • Comments on other data that could have been collected. • Comments on the value of the methods in relation to the aim of the investigation. For level 2 responses candidates will need to link the conclusion to both data presentation methods and analysis. For level 3 responses there should be a greater depth of evaluation recognising the impact of the data collection presentation and analysis on the conclusions made.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

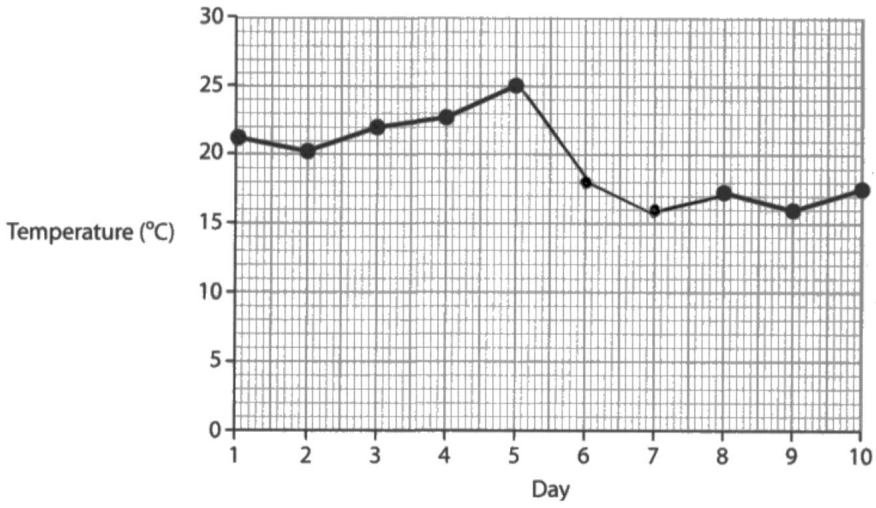
6(a)(i)	**AO3 (1 mark)** B field sketch (1) It cannot be A, C or D as these are all secondary data sources.	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** Award one mark for suitable piece of equipment. • Rain gauge (1) • Thermometer (1) • Hygrometer (1) • Anemometer (1) • Camera (1) • Phone / tablet (1) **Do not credit pen / paper.** Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(b)(i)	**AO4 (2 marks)** Award one mark for correct working, and one mark for correct answer. (8+6+7+8)/4 (1) OR 29/4 (1) 7.3 (1)	**(2)**

Question number	Answer	Mark
6(b)(ii)	**AO3 (1 mark)** Award one mark for suitable sampling strategy named. • Random (1) • Stratified (1) • Systematic (1) • Opportunistic (1)	**(1)**

Question number	Answer	Mark
6(b)(iii)	**AO3 (2 marks)** Award one mark for suitable reason and a further mark for explanation, up to a maximum of two marks. • Data has a much larger range than other sites (1) which suggest an error may have taken place (in data collection) (1). • As there are only four pieces of data (1) it would have been better to take more readings to reduce the effect of anomalies (1). • Holding anemometer at different heights (1) leads to errors (in data) (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(c)(i)	**AO4 (2 marks)** Award one mark for plotting one data point correctly, and a further mark for plotting second data point and the line. Two correct data points plotted with no line drawn award one mark. Completed version:  	**(2)**

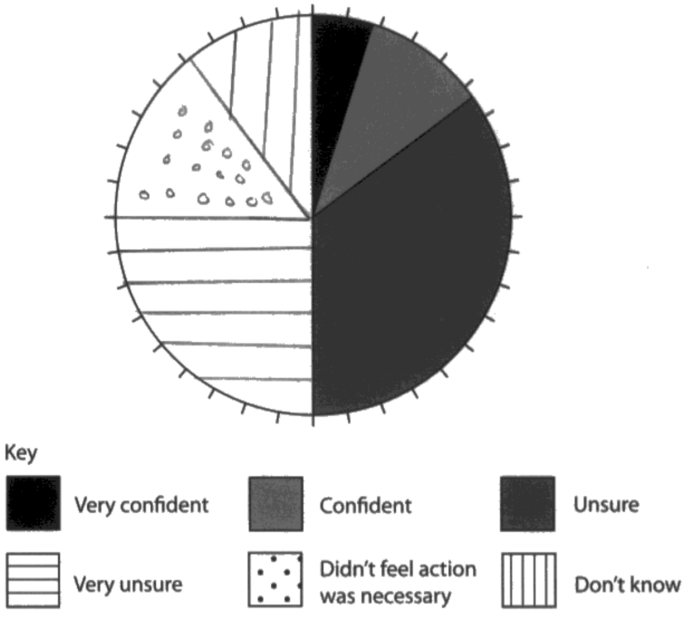
Question number	Answer	Mark
6(c)(ii)	**AO3 (3 marks)** Award 1 mark for identification of a suitable advantage, and a further 2 marks for explanation. • (Line diagrams) allow patterns to be visualized easily (1) and therefore compared to other sites (1) to check if they fit with hypothesis (1) • (Line graphs) are easy to construct (1) using Excel / by hand (1) to be able to spot any anomalies in the data (1). • (Line graphs) are easy to understand (1) which means connections are easily spotted (1) and anomalies can be identified (1). Accept any other reasonable response.	**(2)**

6(a)(i)	**AO3 (1 mark)** C – amount of rainfall (1) It cannot be A, B or D as these are all qualitative data.	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** Award one mark for suitable piece of equipment. • To plan sites for data collection. (1) • To plot data on to explore patterns. (1) • To understand features of the local environment. (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(b)(i)	**AO4 (2 marks)** Award one mark for correct working, and one mark for correct answer. (22+12+33+16+8) / 5 (1) OR 91 / 5 = 18.2 (1)	**(2)**

Question number	Answer	Mark
6(b)(ii)	**AO3 (1 mark)** Award one mark for suitable piece of equipment. • Rain gauge (1) • Bottle with ruler attached (1) • Weather station / meter (1) **Do not credit pen / paper.** Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
6(c)(i)	**AO4 (2 marks)** Award one mark for correct plotting of data (in any order), and a further mark for correct labelling. 	**(2)**

Question number	Answer	Mark
6(c)(ii)	**AO3 (2 marks)** Award one mark each for two suitable ways to improve reliability of the data collected. • Take more measurements. (1) • Compare results to another group. (1) • Use graduated sizes to ensure accuracy of measurements. (1) Accept any other reasonable response.	**(2)**

Question number	Answer	Mark
6(d)	**AO3 (3 marks)** Award 1 mark for identification of a suitable fieldwork technique, and a further two marks for explanation. • They could have used a Stevenson screen (1) to gather a bigger range of data on atmospheric characteristics (1) such as air pressure (1). • They could have gathered secondary data on weather characteristics (1) for the same time of year (1) and compare them to see if there are differences (1). • They could have carried out a bipolar survey (1) to measure the building quality of each area (1) to assess how likely they are to withstand a cyclone (1). Accept any other reasonable response.	**(3)**

6(a)	**AO4 (2 marks)** Award 1 mark for a suitable risk identified and 1 further mark for description of how this was managed. • Getting lost between data collection sites (1) was managed by using a map on google maps. (1). • To reduce the risk of exposure (1) I made sure that I had suitable footwear and clothing (1). • There is a risk of slipping over (1) which can be reduced by wearing appropriate footwear (1). • There is a risk of getting lost (1) so we went around in groups (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO4 (3 marks)** Award 1 mark for initial point, and a further 2 marks for explanation or development. Candidates may refer to how the choices were made on a practical basis, but also in term of sampling strategy. • We chose two sites to conduct our fieldwork (1) one which was in the city centre, and one that was on an outskirts (1) to see if we could find different characteristics (1). • We selected three sites around a town (1) that were in walking distance (1) as this allowed us time to collect the data one day (1). • We used stratified sampling (1) to collect readings from contrasting locations (1) to see how land use changes (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
6(c)	**AO3 (2 marks) /AO4 (2 marks)** Award 1 mark for identification of a primary or secondary data collection method used and a further mark for development through further description or exemplification. Candidates can describe any two methods (primary and/or secondary) of data collection that are appropriate to their enquiry. • I collected data to investigate the different in temperature (1) using a thermometer at dawn, midday and dusk (1). • I collected data on windspeed (1) by using an anemometer once a day for 10 days (1). • We recorded the amount of rainfall (1) using a range gauge placed in an open space to record volume (1). • I drew field sketches (1) to record the landforms/characteristics of each site (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
6(d)	**AO4 (3 marks)** Award 1 mark for identification of data analysis technique used, and a further mark for development through further description or exemplification. • I calculated the mean velocity at each site (1) by adding up each of the velocity readings and dividing by 5 (the number of times I recorded data) (1) to try and smooth out any variations in the data (1). • Used Spearman's rank (1) to compare rainfall and air pressures (1) to determine if the correlation is significant (1). • Calculated a percentage (1) as they are relative (1) which means different sets of data can be compared (1). • Calculated the interquartile range (1) to remove the outliers in the data (1) in case they caused by human error in data collection (1).	

	Accept any other appropriate response. **No credit awarded for identifying a data presentation technique.**	**(3)**

Question number	Answer indicative content
6(e)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates being able to evaluate whether the data presentation techniques used are effective in helping them analyse and identify patterns in the data. The data presentation techniques may be regarded as not appropriate for the data being presented leading to a judgement being made on how helpful they would be in analysis. • At level 1 candidates will likely describe the data presentation methods that are used and may make simple statements about how they can be used for analysis at the top of the level. • At level 2 candidates may describe all of the techniques used as well as making simple statements about how they demonstrate patterns. • For level 3 candidates would be expected to make a judgement on the suitability of the presentation techniques and how they establish patterns or not. **AO3** • Recognition that the data presentation techniques used are appropriate to the data that is being presented – and can help to identify trends and anomalies. • Recognition of the importance of having accurate/specific axis labels on the data presentation techniques. • Recognition that there are improvements/alternatives which could increase the usefulness of the data presentation techniques provided. • Recognition that there are limitations to the data presentation techniques used. • An evaluation of how far the student's data presentation methods can be trusted may be provided.

	AO4 • Figure 6a shows a scatter graph comparing average wind speed and rainfall. • Figure 6a does not show which plot represents the site at which the data was collected. • Figure 6a shows average wind speed but does not give detail about how many data points this is based on. • Figure 6b shows a bar graph of temperature and day for site 1 and 2. • Figure 6b numbers the day data was collected but does not identify where the sites were located.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question 6

Question number	Answer	Mark
6(a)	**AO4 (2 marks)** Award 1 mark for a suitable reason and 1 further mark for explanation or development. • My hometown experience significant changes in the weather during the summer (1) which meant that I could examine changes over time (1). • I wanted to investigate weather characteristics over time (1) and setting up recording equipment at school and at home were the most practical options (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO4 (3 marks)** Award 1 mark for identification of suitable method, and a further 2 marks for explanation or development. • Measuring wind speed (1) which meant we had to collect data using an anemometer (1) which we could then use to track changes over a ten day period (1). • Measuring rainfall (1) we had to use a rain gauge which I set up in two locations in the city (1) and would return to check measurements each day in the morning before school (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
6(c)	**AO4 (3 marks)** Award 1 mark for identification of a suitable advantage, and a further mark for development through further description or exemplification. • I used a scattergraph (1) which allowed me to see a correlation between factors (1) which meant I could produce a clear conclusion (1). • I used graphs to plot temperatures (1) which meant I could easily compare across different sites (1) and recognise any differences (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
6(d)	**AO3 (2 marks) /AO4 (2 marks)** Award 1 mark for identification of data analysis technique used and a further mark for development through further description or exemplification. • I calculated the mean (1) to try and smooth out any variations in the data (1). • I created a scattergraph of rainfall and wind speed to analyse the data for any correlations (1) and identify anomalies/outliers (1). • I used Spearman's rank correlation (1) to be able to indicate any strong or weak correlations between my data on rainfall and air pressure (1). • Calculated a percentage (1) which means different sets of data can be compared (1). • Calculated the interquartile range (1) to remove the outliers in the data (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
6(e)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates being able to evaluate whether the data collection methods used were effective in helping the student achieve their aim. • At level 1 candidates will likely describe the data collection methods that are used and may make simple statements about how they can be used for analysis at the top of the level. • At level 2 candidates may describe all of the techniques used as well as making simple statements about how they could be used to by the candidate to reach their aim. • For level 3 candidates would be expected to make a judgement on the suitability of the collection methods and how they would support the analysis for the student to be able to achieve their aim. **AO3** • Recognition of limitations in the data collection/sampling techniques may be flawed in terms of the number of sites and the time of year. • Recognition that the data collection methods used are appropriate to support a range of data presentation methods. • Reliability and accuracy of the student's methods may be evaluated with reference to the potential evaluation, including equipment errors and operator errors. • Recognition of sampling strategy e.g. random, stratified and/or systematic is important, and could have affected data collected. • An evaluation of how far the student's data collection methods would also depend on the accuracy of how they were carried out could also be included.

	AO4 • In this response there would be an expectation for the students to evaluate the different data collection methods and how they relate to later stages of the enquiry (data analysis and reaching conclusions). • Students should look to identify the appropriateness of data collection methods. • There could be an evaluation of the lack of secondary data to support primary data. • A view could be given on how successful or unsuccessful the data collection methods were and how they could be improved to help students gather more effective results.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)	**AO4 (2 mark)** Award 1 mark for identifying a relevant data presentation type and a further mark for development up to a maximum of two marks. • Used pie charts (1) to show results of closed questions in questionnaire (1) • Annotated photographs (1) of before and after the cyclone (1) • Used land use map (1) to show human and physical areas (1) Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Using data from other investigations carried during previous storms could be unreliable (1) as we do not know how accurately the previous groups collected the data (1) making comparisons to own data inaccurate (1). • Using newspaper articles can be less accurate as they often report an individual's perspective (1) which do not give the full details of the event making comparing data unreliable (1).	

	Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
6(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of an improvement and a further mark for explanation up to a maximum of two marks each. • Ask open questions (1) to ensure all opinions are fully represented (1) • Ensure weather recording equipment is calibrated (1) to ensure accurate data is recorded (1) • Ensure data in weather diary is recorded daily (1) to ensure only one days rainfall is recorded (1) • Place the rain gauge in an open area (1) to avoid a false reading (1) • Take more measurements (1) to reduce the influence of anomalies (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
6(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • As air pressure decreased there was more rainfall (1) because air is rising (1) leading to evaporation and cloud formation (1) • Local people living in areas with better quality housing (1) have a more positive hazard perception (1) because the buildings are less likely to be damaged (1). • Sites closest to the coast had higher rainfall levels (1) than sites more inland because of evaporation (1) as air moves over the ocean leading to more rainfall (1). Accept any other appropriate response.	**(3)**

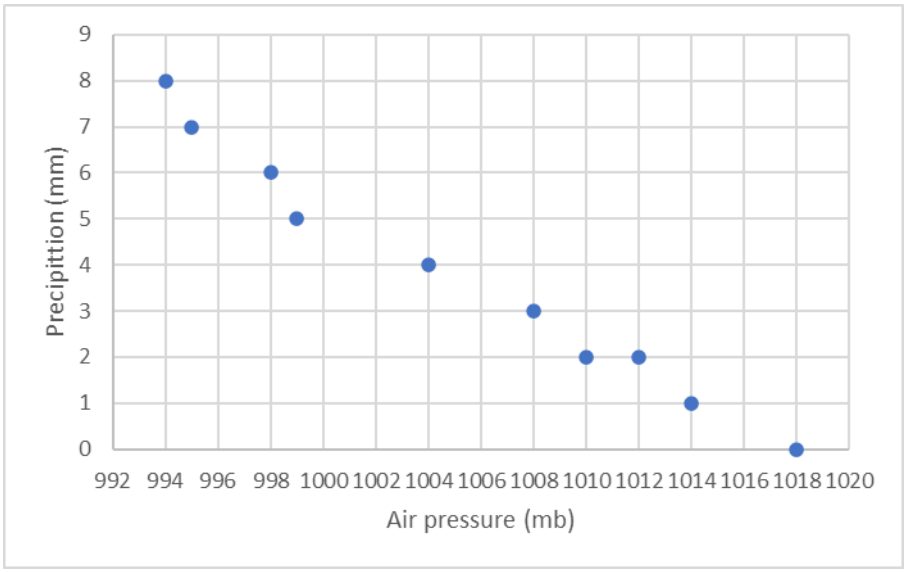
Question number	Answer	Mark
6(e)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the reliability of the students conclusions. Candidates will need to be able to identify the limitations in the methods and conclusion reached in the investigation and decide how this affects the validity of the conclusion reached. **AO3** • The risk mapping suggests that areas that have higher vulnerability will experience the worst weather conditions. • Random sampling may not ensure that there is enough variation in sites chosen to fully represent differing levels of risk in areas at risk of tropical cyclones. • The data was collected during March which is outside the tropical cyclone season for this part of the world meaning weather is often less extreme. • Students did not repeat measurements meaning averages could not be calculated which can increase the influence of anomalies on their results. • Students should have ensured they collected data before and after an extreme weather event. • The students conclusion does fit the expected relationship between air pressure and rainfall. **AO4** • The three sites are all located on the east coast in central Vietnam. • There are no areas away from the coast investigated. • Site 2 has the highest amount of rainfall and the lowest air pressure. • Site 1 and 3 have the same amount of rainfall. • Site 1 and 3 have the same air pressure.	
		(8)

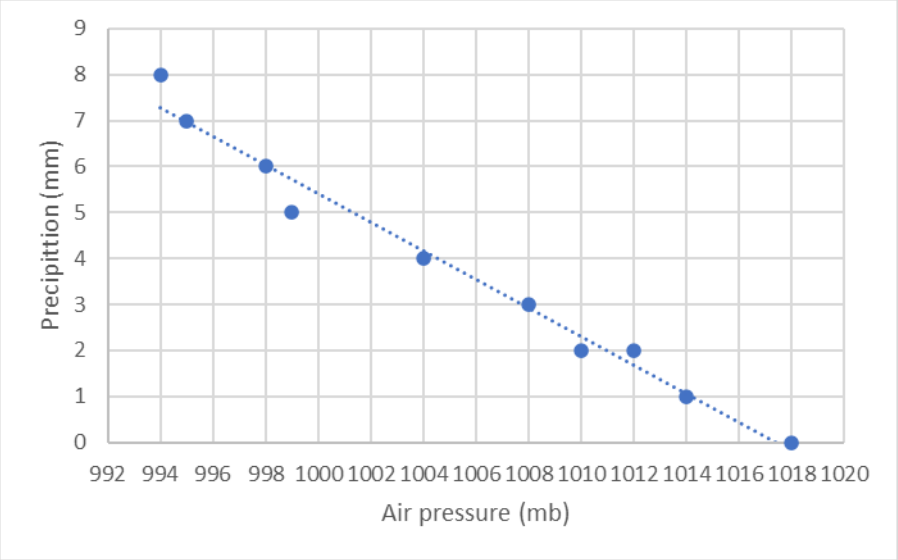
Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)(i)	**AO3 (1 mark)** **A** (barometer) Cannot be B (gradient), C (direction) or D (temperature).	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO3 (1 mark)** • High winds (1) • Heavy rainfall (1) • Strangers in urban areas (1) • Crossing roads in urban areas (1) • Getting lost (1) • Thunderstorms / lightning (1) • Tripping on uneven surfaces / pavements (1) • Slipping on wet ground (1) **No credit for just stating 'weather'.** Accept any other acceptable response.	**(1)**

Question number	Answer	Mark
6(b)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. 24-12 = 12°C	**(2)**

Question number	Answer	Mark
6(c)(i)	**AO4 (2 marks)** Award 1 mark for each correct plot  	**(2)**

Question number	Answer	Mark
6(c) (ii)	**AO4 (1 mark)** Award 1 mark for correct line of best fit drawn. The line drawn needs to have at least 2 plots above the line of best fit and 2 plots below the line of best fit OR be drawn through 5 data plots for credit.  **No credit for curved line of best fit.**	(1)

Question number	Answer	Mark
6(c)(iii)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • There is a negative correlation between precipitation and air pressure (1) because there is evaporation in areas of low pressure (1). • As air pressure increases precipitation decreases (1) because there is more warm rising air at low air pressures (1). • As one increases the other decreases because there is more rain during low pressure (1) because more clouds form (1). Accept any other acceptable response.	(2)

Question number	Answer	Mark
6(d)	**AO3 (3 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Students may find it useful to collect data on wind speed (1) as a lower air pressure is likely to increase wind speeds (1) as more air is rising (1). • Students could collect data on people's perception of risk (1) as this is based on personal perceptions (1) which can influence how people feel about a place (1). • Students could do a field sketch at each site (1) as it can be useful to have qualitative data collection (1) which will help them to remember the features of the hazardous environment (1). Accept any other acceptable response.	(3)

Question number	Answer	Mark
6(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the accuracy and reliability of the student's own data collection methods. The candidate needs to evaluate the strengths and weaknesses of several different data collection techniques they used in their enquiry and reach a judgement on how effective their data collection was overall. **AO3** • Accuracy is about how correct or incorrect the data written down is. • Reliability is about how dependable the data collected is and often relates to having a big enough sample size to make a judgement. • Data collection techniques are the methods adopted when collecting data. • There are different sampling strategies which have a range of advantages and disadvantages that need to be considered to increase reliability. • Consideration of different equipment errors and the impact these might have had on accuracy of data.	(8)

		• Consideration of the number of sites and samples taken and the impact these might have on reliability. • A judgement about which techniques were reliable and/or accurate. • A judgement about overall accuracy and reliability of data collection techniques. **AO4** • Detail about the specific sampling strategies used of their own data collection techniques. • Detail about the site selection for enquiry. • Detail about the sample size for each set of data collected. • Detail about the equipment used for each technique. • Detail about rationale for taking more than one reading for a data type.	

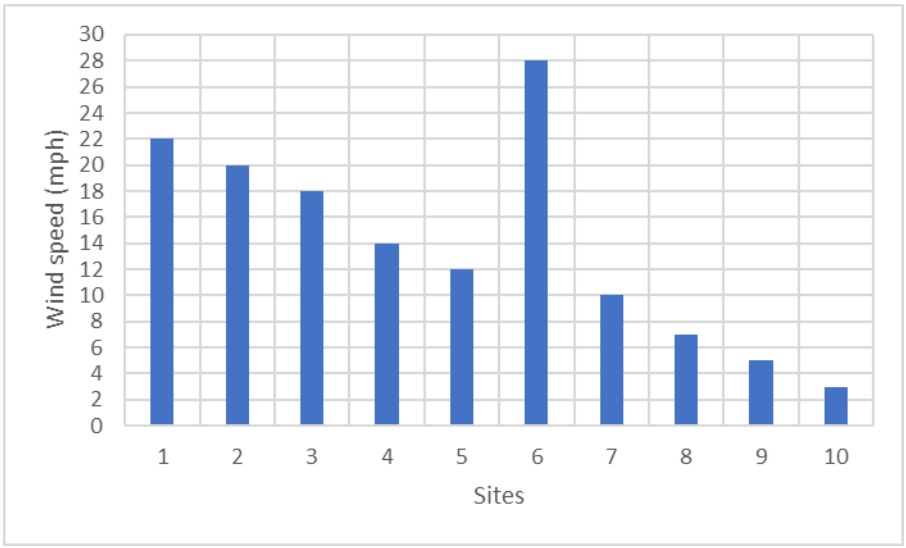
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)(i)	**AO1 (1 mark)** **B** (information collected by other people) Cannot be A, C or D (primary data)	**(1)**

Question number	Answer	Mark
6(a)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Field sketch (1) • Photograph (1) • Open question survey/questionnaire (1) • Interviews/focus groups (1) Accept any other acceptable response.	**(1)**

Question number	Answer	Mark
6(b)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • There is a risk of flying debris (1) which can cause injury (1). • There is a risk of grit getting in eyes (1) which can cause irritation (1). • High winds (can make it difficult to hear) (1) which can increase risk of getting lost from group (1). • Crossing roads (1) as could be injured (by vehicle) (1). • Poor visibility (due to fog) (1) causing people to be separated from group / get lost (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
6(c)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. 994 , 994 , 995 , 1000 , 1002 , 1004 , 1007 , 1008 , 1008 , 1008 1002 + 1004 = 2006 / 2 = 1003 Answer = 1003 mb	**(2)**

Question number	Answer	Mark
6(d)(i)	**AO4 (2 marks)** Award 1 mark for each correct plot. 	(2)

Question number	Answer	Mark
6(d) (ii)	**AO4 (1 mark)** Award one mark for any of the following: • (Site) 6 (1)	(1)

Question number	Answer	Mark
6(d) (iii)	**AO4 (3 marks)** Award 1 mark (AO4) for initial point and further marks for evidence (AO4) up to a maximum of three marks. • The student may have stood in a very exposed / open area (1) which was not consistent with other areas in the sample (1) leading to a much higher reading (1). • The student may not have held the anemometer correctly (1) this could have increased the movement of the cups (1) leading to a higher number being recorded (1). • A gust of wind from vehicle (1) could have been included in the recording (1) leading to an error in the data recorded (1). Accept any other acceptable response.	(3)

Question number	Answer	Mark
6(e)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the reliability of the students own conclusions. The candidate needs to evaluate the strengths and weaknesses of several sets of data in order to determine the reliability and accuracy of their conclusion. This should include judgement on influence of anomalies and the extent to which data fits known theories or trends. **AO3** • Accuracy is about how correct or incorrect the data written down is. • Reliability is about how dependable the data is and often relates to having a big enough sample size to reach a conclusion. • Conclusions can determine the extent to which the results fit a theory. • Data collection techniques are very important in determining accuracy of conclusions. • There are different sampling strategies which have a range of advantages and disadvantages that need to be considered when reaching a conclusion. • Consideration of different equipment errors and the impact these might have had on accuracy of data. • Consideration of ways the accuracy of the conclusions could have been improved. • Conclusions should make a judgement about the presence of anomalies and whether they be included or excluded from the analysis. • A judgement about which techniques were reliable and/or accurate. • A judgement about overall accuracy of conclusion drawn. **AO4** • Detail about overall conclusions drawn from own enquiry. • Detail about the specific sampling strategies used of their own data collection techniques. • Detail about the site selection for enquiry. • Detail about the sample size for each set of data collected. • Detail about the equipment used for each technique. • Detail about rationale for taking more than one reading for a data type. • Detail about anomalies in own results.	**(8)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

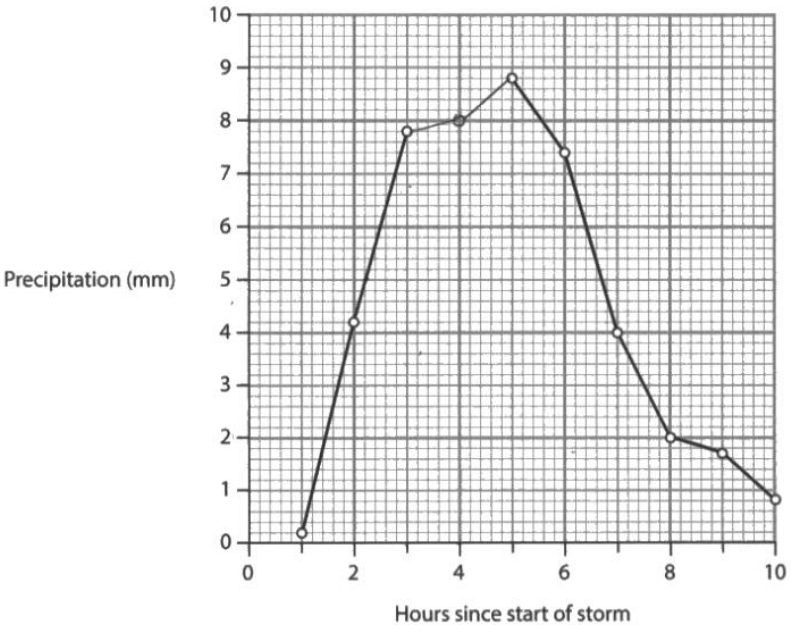
Question 6

Question number	Answer	Mark
6(a)	**AO3 (1 mark)** Award 1 mark for a suitable piece of equipment. • Stopwatch (1) • Ruler / tape measure (1) • Thermometer (1) • Rain gauge / beaker / measuring cylinder (1) • Oktas scale (1) • Barometer (1) • Anemometer (1) • Compass (1) • Beaufort scale (1) Accept any other acceptable response. **No credit for stationery e.g. pen/paper**	**(1)**

Question number	Answer	Mark
6(b)	**AO3 (2 marks)/AO3 (2 marks)** Award 1 mark (AO1) for initial point and a further mark for development (AO2) up to a maximum of two marks. Advantage: • Field sketches help us remember the place (1) which can help to interpret data (1). • Field sketches allow for key features to be highlighted (1) which helps to explain data (1). • Field sketches allow notes to be added at the time of drawing (1) which helps to understand the environment being sketched (1). • Field sketches can be used to visualise the landscape before visiting (1) to help plan where to collect the data (1). Disadvantage: • Field sketches take more time than photographs (1) which can be a challenge if in a rush (1). • Field sketched cannot show change over time (1) which can bias your findings if it is completed at a certain time of year (1). • Field sketches are not drawn to scale (1) making it less accurate (1).	

	• Field sketches are subjective (1) so may miss key details compared to someone else drawing it (1). Accept any other acceptable response.	**(4)**

Question number	Answer	Mark
6(c)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. • (13-5 = 8) 8/5 x 100 (1) • = 160% (1) **Note**: figures in brackets as first part of method are not required for first mark.	**(2)**

Question number	Answer	Mark
6(d) (i)	**AO4 (2 marks)** Award 1 mark for correct plot and second mark for joining points.  	**(2)**

Question number	Answer	Mark
6(d)(ii)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • Rainfall is low as the storm starts (1) as the low pressure front arrives (1). • Rainfall rises to a peak after 5 hours (1) as the centre of the storm arrives overhead (1). • Rainfall starts low, rise and falls rapidly (1) as the storm travels overhead (1). • Rainfall starts low, rises and falls rapidly (1) it starts at 0.2mm and peaks to 8.8mm at 5 hours (1). Accept any other acceptable response.	**(2)**

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Question number	Answer	Mark
6(d)(iii)	**AO3 (1 mark)** **B** (data that does not fit the pattern) Cannot be A (quantitative), C (distribution) or D (trend).	**(1)**

Question number	Answer	Mark
6(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the effectiveness of planning their sampling for data collection. The candidate needs to evaluate the strengths and weaknesses of their site selection and sampling strategies to reflect on the reliability of their conclusion. **AO3** • Consideration to location and number of sites chosen for data collection. • It may be important to ensure key features of the area are represented in data collected. • Sites need to be easily accessible. • There are three main sampling strategies – systematic, random, stratified. • Random sampling removes bias from data collected. • Random sampling can lead to poor representation in data. • Systematic sampling ensures good coverage of sample area.	**(8)**

	• Systematic sampling is more biased as not all areas have equal chance of being selected. • Stratified sampling can be more representative. • Stratified sampling is difficult if sub-sets are not accurate/known. • A judgement about how site selection and sampling strategies helped to answer their enquiry title. **AO4** • Detail about the specific way they chose their sites in relation to collecting accurate/reliable data. • Detail about how many sites were selected and why this number of sites was chosen. • Detail about the sampling strategies used for each type of data collected and why this strategy was chosen. • Detail about any limitations in their chosen site and sampling strategies. • Detail about whether they could answer their hypothesis/predictions/enquiry questions. • Detail about specific mitigation strategies used to ensure data collected was reliable and accurate. • Detail about what conclusion were reached.	

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)	**AO4 (2 marks)** Award 1 mark for identifying a relevant sampling technique and a further mark for development up to a maximum of two marks. • Random sampling (1) using a random number generator to select our sites (1). • Systematic sampling (1) to measure every 20 m (1). • To measure at equal intervals (1) by measuring the wind speed every 6 hours (1). • Opportunistic sampling (1) to ask people (my questionnaire) walking past (1). • Stratified sampling (1) to choose sites in sheltered and exposed areas (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial variable identified and 2 marks for further explanation up to a maximum of 3 marks. • I measured the temperature (1) every three hours using a thermometer (1) to get an average temperature for the weather event (1). • I measured the wind speed (1) at three sites exposed and sheltered (1) to determine the influence of buildings on wind speeds (1). • I measured the amount of precipitation (1) in the morning and evening using a rain gauge (1) to identify any relationship between precipitation and wind speed/temperature (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
6(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of a variable used to present data and a further mark for explanation up to a maximum of two marks each.	

	• Presented temperature data (as a line graph) (1) as this is continuous data (1). • Presented closed questionnaire questions (as pie charts) (1) this made it easy to compare differences at different sites (1). • Presented precipitation data (as a bar graph) (1) as the site could be presented on the x axis as it is discrete (1). • Presented wind direction and strength (as a proportional symbol) (1) so the data could be located on a map to make it more useful (1).	**(4)**

Question number	Answer	Mark
6(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • The bigger your data sample the more representative it will be (1) this means you are more likely to get the same results (1) if you repeat the investigation (1). • More data means you reduce the influence of outliers (1) but working out interquartile range (1) giving a more reliable dispersion of data (1). • Having more data means you are less likely to miss a key characteristic of the environment (1) as your samples are collected close enough together (1) to ensure small changes are recorded (1). • Have more wind data will avoid anomalies (1) from gusts / heavy goods vehicles driving past (1) affecting your central tendency values (1).	**(3)**

Question number	Answer	Mark
6(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the validity of the hypothesis proposed. The candidate needs to evaluate the strengths and weaknesses of the information shown in the	**(8)**

	secondary data source and make a judgement about feasibility of the hypothesis proposed. **AO3** • Local live feed / risk maps show data spatially. • Secondary sources can be out of date making information less reliable. • Secondary sources will not show the exact sites the primary data is collected from. • Time of year can affect the environment making primary and secondary sources very different. • It is difficult to determine if secondary data was collected accurately. • Weather is very seasonable making it difficult to make a definitive hypothesis. • Climate change is affecting weather events making it difficult to predict future weather events. • Areas with tall buildings can alter wind patterns in an area. • The hypothesis is valid for the extreme weather event shown in the secondary source. • Every extreme weather event is different meaning the hypothesis may not be fully valid. • The hypothesis is less suitable as the lowest air pressure is not always when wind speed is at the highest. **AO4** • Figure 6 shows the highest wind speed was 50 kph. • Figure 6 shows the lowest wind speed was 10 kph. • Figure 6 shows the highest air pressure was at 7am. • Figure 6 shows the lowest air pressure was at 3pm. • Figure 6 shows the wind speed fluctuates much more than air pressure, which falls consistently after 7am.	

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)

Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

6(a)	**AO4 (2 marks)** Award 1 mark for identifying a relevant risk and a further mark for development up to a maximum of two marks. • Getting hit by flying debris (1) causing injury (1). • Slipping on wet/uneven ground (1) causing injury (1). • Getting lost (1) leading to distress/anxiety (1). • Getting wet and cold (1) causing hyperthermia (1). • Getting lost (1) so stayed in groups (1). • Slipping on uneven ground (1) so wore appropriate footwear/trainers/shoes with good grip (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
6(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial data collection method and 2 marks for further explanation up to a maximum of 3 marks. • I created a questionnaire with 10 closed questions (1) to determine local people's perception of risk (1) to be able to present results (1). • I used stratified sampling (1) for my questionnaire (1) to get a representative sample of people's opinions/views (1). • I recorded air pressure (1) using a barometer (1) to make links to compare how pressure affects temperature/wind speed/precipitation/cloud cover (1). • I measured wind speed (1) using an anemometer (1) to identify the impact of sheltered and exposed areas (on wind speeds) (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
6(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of a factor that increases accuracy and a further mark for explanation up to a maximum of two marks each. • Used a protractor to draw the proportions on pie	

	charts (1) to ensure the degrees equaled 360 (1). • Used a ruler to draw bars (1) to ensure each bar was the same width (1). • Used a consistent scale on the y axis (1) to ensure height/size was not distorted (1). • Ensured axis begun at zero (1) to avoid distorting the pattern on the graph (1). • Used a computer / Excel to plot data (1) to ensure points on the line graph were placed accurately (1).	**(4)**

Question number	Answer	Mark
6(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Not ensuring the liquid in the thermometer has time to settle (1) before taking the reading (1) meaning the wrong data is recorded (1). • Using the oktas scale to measure cloud cover uses estimates (1) different people would make different judgements (1) meaning variable results (1). • Using the Beaufort scale is judgement based (1) this means different people would make different decisions (1) which is unreliable (1). • Not calibrating equipment (1) could mean it produces incorrect readings (1) which are not noticed (1). • There were no anomalies in my data (1) because I used calibrated equipment (1) ensuring accuracy of my data (1). • Starting the stopwatch late (1) due to human error (1) meant we didn't record the average wind speed for the same amount of time (as at other sites/different times of the day) (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
6(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant	**(8)**

	material not suggested below must also be credited. This question is about evaluating the how well the secondary data supported the students' conclusion. The candidate needs to evaluate the strengths and weaknesses of the information shown in the secondary data source and make a judgement about the validity of the conclusion drawn. **AO3** • Local live feed / risk maps show data spatially. • Secondary sources can be out of date making information less reliable. • Secondary sources will not show the exact sites the primary data is collected from. • Time of year can affect the environment making primary and secondary sources very different. • It is difficult to determine if secondary data was collected accurately. • Weather is very seasonable making it difficult to make a definitive conclusion. • Climate change is affecting weather events making it difficult to predict future weather events. • Every extreme weather event is different meaning the conclusion may not be fully valid. • The conclusion reached is less valid as northwest Florida receives more rain annually than Miami. **AO4** • Figure 6a shows southern Florida experiences heavy rain 3rd June. • Figure 6 shows Miami is expected to receive 10 inches of precipitation in the June extreme weather event. • Figure 6 shows the west coast of Florida receives similar amounts of precipitation each year. • Figure 6 shows Miami does receive 60-64 inches of precipitation each year. • Figure 6 shows Miami is an anomaly in the average annual precipitation map.	

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)

Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)