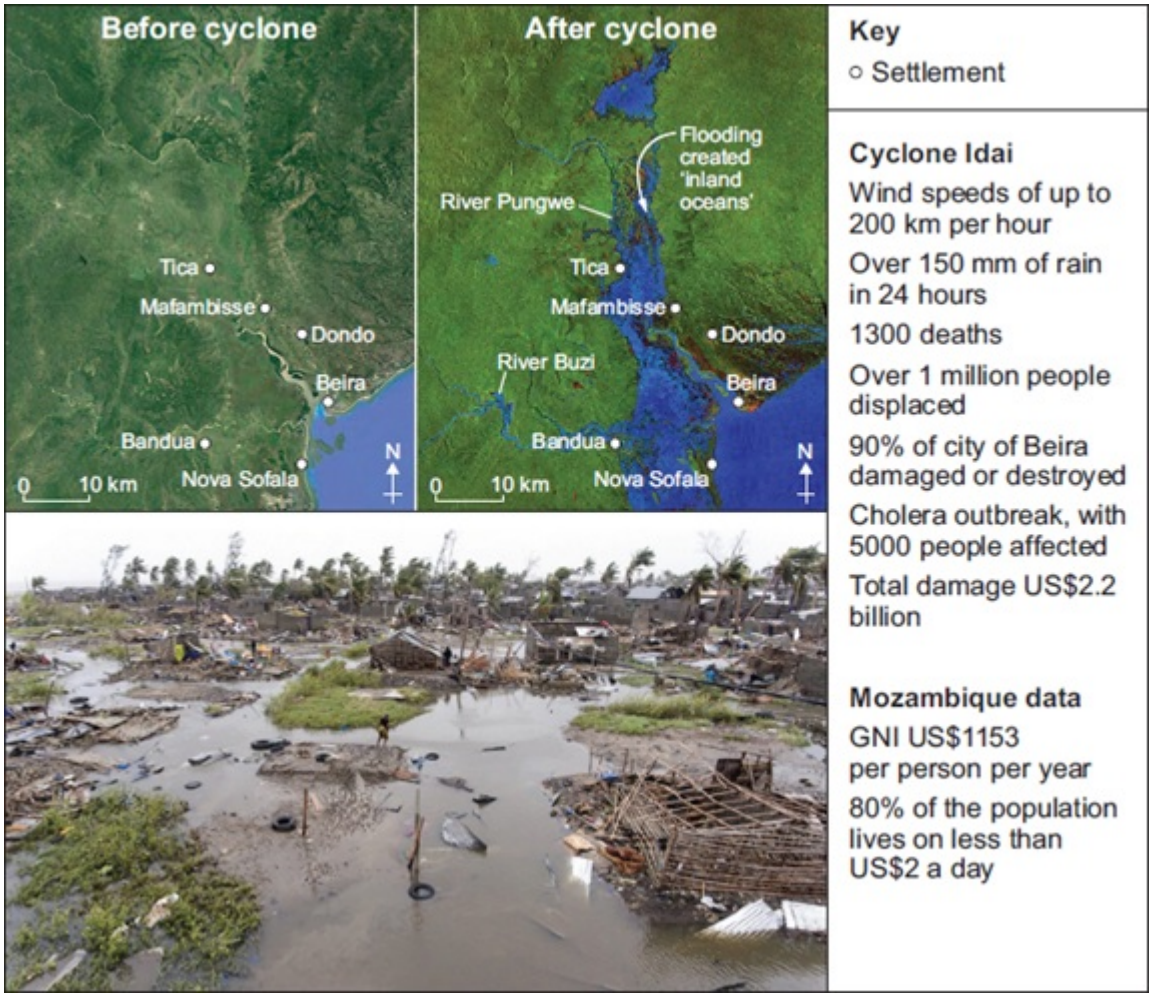
1. Study the information below about Cyclone Idai and its impacts on Mozambique.



Suggest why some tropical storms have severe primary **and** secondary effects.

Use the information above and your own understanding.

(Total 6 marks)

2. Study the information below about extreme weather in the UK in March 2018.

Snow warnings

Yellow:

- Some impacts
- Disrupted travel

Amber:

- Severe impacts
- Road and rail closures
- Potential risk to life and buildings

Red:

- Dangerous weather
- Risk to life
- Major disruption to travel and power supplies

'Beast from the East' causes chaos across Britain. The killer freeze costs the UK £1 billion per day as transport routes are disrupted by snow and ice. Businesses and schools are forced to close.

Suggest how extreme weather in the UK can have economic and social impacts.

Use the information above and your own understanding.

(Total 6 marks)

3. Study the text and photo below about a news report and photograph showing the effects of Hurricane Irma on the Dutch island of Sint Maarten.

'Hurricane Irma hit several islands in the Caribbean on 6 September 2017, with devastating consequences for the local population. On Sint Maarten, it has so far resulted in eight deaths. Officials say that 95% of the island has been destroyed and the international airport and harbour have been seriously damaged. Power, running water and most communications have been knocked out by this powerful storm.'

Photo: Overturned shipping containers in Sint Maarten

Assess the extent to which tropical storms have effects on people and the environment.

Use the information above and an example you have studied.

(9)

[+ 3 SPaG marks]

4. Study **Figure 1**, photographs showing some of the impacts of extreme weather in the UK.

Figure 1

Higher summer temperatures and lower rainfall in some areas have increased the risk of moorland fires.

Higher rainfall and more storm events have increased the risk of flooding.

'UK weather is becoming more extreme.'

Do you agree?

Use **Figure 1** and your own understanding.

(Total 6 marks)

5. Explain how planning can reduce the effects of natural hazards in urban areas.

(Total 6 marks)

6. The figure below describes natural hazards in urban areas in less developed countries.

EARTHQUAKE FLATTENS CAIRO SLUMS

There was a powerful earthquake in the Egyptian city of Cairo yesterday. Hundreds of people died and thousands of people were injured. The modern, high-rise buildings next to the River Nile were not affected. However, many of the poorer slum areas were badly damaged. In these areas the poorly built, illegal homes collapsed, trapping people under rubble.

LANDSLIDES DESTROY PARTS OF RIO DE JANEIRO

After days of heavy rainfall, flooding and landslides have caused devastation in parts of Rio de Janeiro, one of the largest cities in Brazil. In one area a block of flats fell down when floodwater washed away the foundations.

Many poor people live in slums built on steep hillsides. The rainfall caused landslides on many of these slopes. Thousands of tons of mud and rocks flowed down hillsides, burying everything.

Over a hundred people were killed and thousands of people were made homeless because of the floods.

(i) Suggest **two** reasons why large numbers of people are at risk from natural hazards in urban areas.

Use the figure above to help you.

(4)

(ii) Describe the problems that natural hazards cause in urban areas.

Use the figure above and your own knowledge.

(6)

(iii) Explain how the effects of natural hazards in urban areas can be reduced.

Use an example(s) you have studied.

(6)

(Total 16 marks)

7. Discuss issues raised in preparing for and dealing with the impacts of extreme weather such as that shown in **Figures 1a** and **1b** below.

Figure 1a

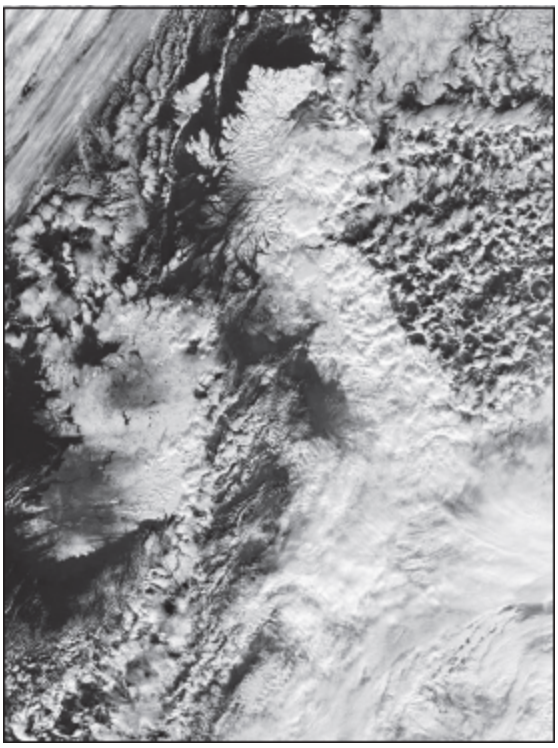


Figure 1b

At Altnaharra in the Highlands of Scotland the temperature fell to –21.2 °C, the coldest on record for 2 December.

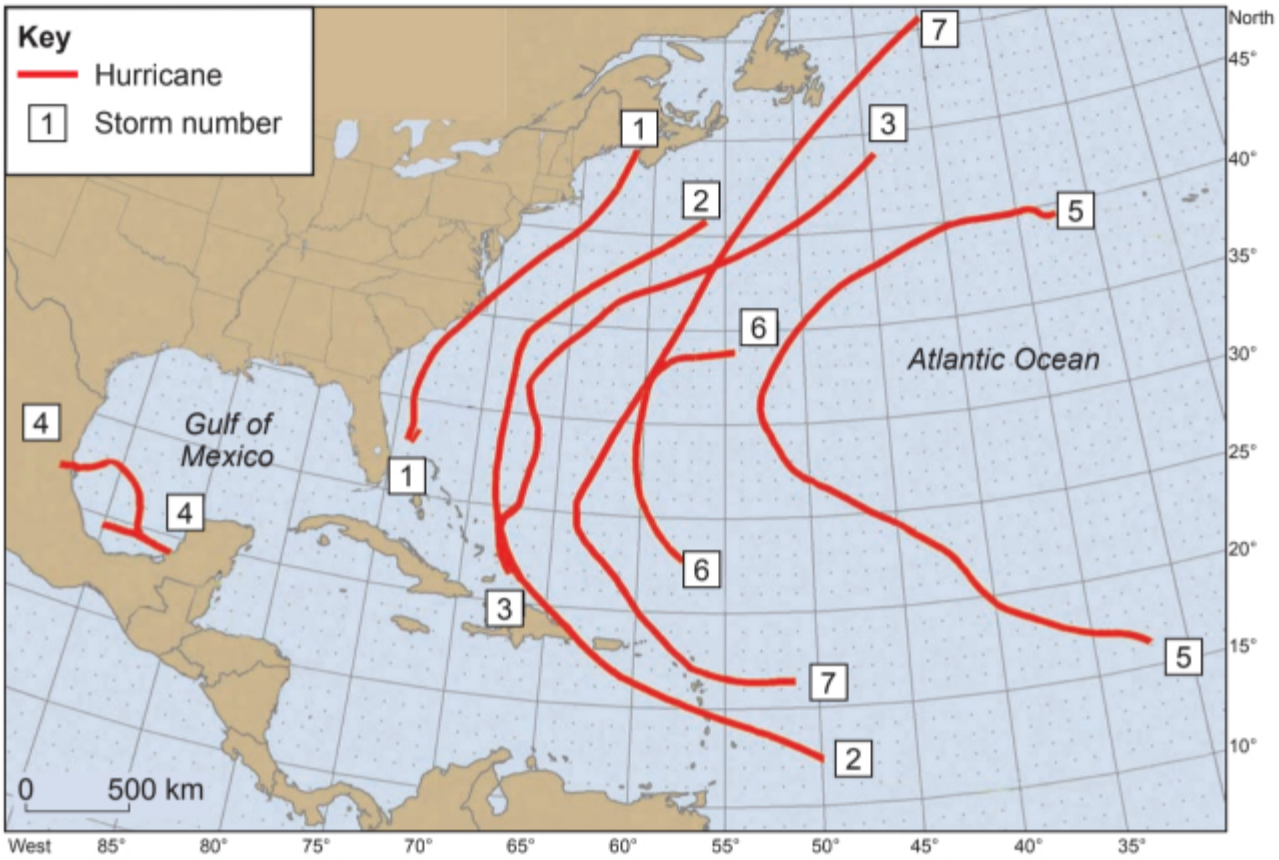
Gatwick Airport remained closed for a second day and was not expected to open before this morning. A spokesman said that 45 cm of snow over the past two days was too much for a team of 100 people and 45 vehicles trying to clear the single runway.

The Weather Outlook

- **Tomorrow**: Slightly warmer across UK, reaching 5 °C in the South West, 2 °C in London, 0 °C in Scotland.
- **Sunday**: Remaining slightly milder. Dry, sunny and pleasant over almost the entire country.
- **Monday**: Much colder over the whole country. Threat of thick fog and icy conditions.
- **Tuesday**: Little change.

(Total 8 marks)

8.



Storms in 2014

Number	Name	Date
1	Arthur	1 – 5 July
2	Bertha	1 – 6 August
3	Cristobal	23 – 29 August
4	Dolly	1 – 3 September
5	Edouard	11 – 19 September
6	Fay	10 – 13 October
7	Gonzalo	12 – 19 October

(a) Study the diagram, a map showing the tracks of hurricanes in 2014.

Describe the pattern shown in the diagram above.

(3)

(b) Describe the structure of a hurricane.

(3)

(c) Explain the formation of hurricanes.

(6)

(Total 12 marks)

9. 'The weather of the UK is becoming more extreme.'

Use evidence to support this statement.

(Total 6 marks)

10. Assess the extent to which prediction is the most important factor in reducing the effects of tropical storms.

(Total 9 marks)
(+ 3 SPaG marks)

11. Using a named example, evaluate the immediate and long-term responses to tropical storms.

(Total 9 marks)
(+ 3 SPaG marks)

Mark schemes

1.

Level	Marks	Description
3 (Detailed)	5 – 6	AO2 Shows thorough geographical understanding of the primary and secondary effects of tropical storms. AO3 Demonstrates coherent application of knowledge and understanding in analysing the severity of primary and secondary effects of tropical storms.
2 (Clear)	3 – 4	AO2 Shows some geographical understanding of the primary and/or secondary effects of tropical storms. AO3 Demonstrates reasonable application of knowledge and understanding in analysing the severity of primary and/or secondary effects of tropical storms.
1 (Basic)	1 – 2	AO2 Shows limited geographical understanding of the primary and/or secondary effect(s) of tropical storms. AO3 Demonstrates limited application of knowledge and understanding in analysing the severity of primary and/or secondary effect(s) of tropical storms.
	0	No relevant content.

- **Level 3** (detailed) responses will be developed. Some geographical terms will be applied. All aspects of the question are answered, including both primary and secondary, although the two aspects may not be balanced. Uses Figure with elaboration and own understanding. Fully explains the severity of some tropical storms.

- **Level 2** (clear) responses are likely to have linked or elaborated statements and some use of geographical terms. May cover primary or secondary effects only. Uses Figure with some elaboration and /or own understanding. May explain the severity of some tropical storms.

- **Level 1** (basic) responses may comprise simple/partially inaccurate statements with very limited subject vocabulary. Partial sequence or random points made. May be limited to a single primary **and/or** secondary effect only. May rely on direct or lifted use of Figure or own understanding only. May refer to the severity of some storms.

- Max L1 if referring to a natural hazard that is not tropical storms.
- Max L2 for explanation of primary or secondary effects only.
- Max L2 for explanation of effects without reference to the image.

Indicative content

The command word is “suggest”, so responses should set out the likely impacts of tropical storms, making use of the image.

- **Primary** effects are the direct result of a tropical storm, such as collapsed buildings. **Secondary** effects are the result of primary effects such as fires from broken gas lines. They also include long-term hazards like water-borne diseases.

- The initial primary effects of a storm involve destructive winds, torrential rain and storm surges.

- **Primary effects** may include:
  People being killed or injured, often caused by flying debris or by drowning.
  Homes destroyed.
  Transport and communication links not working.
  Damage to infrastructure.
  Energy supplies cut off.
  Trees uprooted by strong winds.
  Storm surge raises sea level and floods over the low lying land.

- **Secondary effects** may include:
  People being left homeless.
  A lack of clean water and sanitation.
  Water-borne diseases.
  Unemployment caused by businesses being damaged.
  If crops are destroyed and/or livestock is killed there can be a shortage of food.
  Looting and other crime.
  Local economy disrupted, including manufacturing and tourism.
  Reduced trade.
  Longer term health effects.
  Insurance claims.
  Destruction of crops.
  Disruption to coastal habitats.
  Mudslides, landslides.

- Accept some secondary effects as primary, for example homelessness and displacement of population, as there is some dispute over the precise definition.

- Analysis of the image. Allow any reasonable inference from the photograph, maps and text. Primary effects include strong winds, torrential rain, roofs and walls of buildings blown away, some buildings destroyed, some buildings underwater, damage to infrastructure, disruption to roads and other communications, large numbers killed or injured.

- Secondary effects include damage to local economy, longer term financial impacts, people stranded and made homeless/unemployed, pollution risk, danger of water borne diseases.

- Map shows widespread nature of destruction, partial flooding of several large settlements, and submergence of low-lying land near rivers.

- Fact file indicates loss of human life, homelessness, economic effects and longer term disease risk. Economic data on Mozambique suggests that both primary and secondary effects may be worsened by low incomes and limited investment in monitoring, preparation and protection.

- Credit reference to example of tropical storm, although this is not essential to access Level 3, eg Typhoon Haiyan. Primary effects. Strong winds destroyed homes. Over 6,000 people died. Power was interrupted, the airport was badly damaged and roads were blocked by trees. Tacloban was destroyed. Secondary effects Damage to rice and seed stocks. Farmers and fishers lost their income. Huge recovery costs for agriculture and fishing. Looting problems. Increased food prices. Risk of infection and spread of disease.

- Assessment of why some tropical storms have severe effects – this may be linked to:
  Strength of storm-wind speeds, size of storm surge, amount of rain extent of area flooded.
  Population density in vulnerable areas.
  Wealth of country and money invested in forecasting, warning systems, protection, planning and responses.
  Physical geography of coastal zone.
  Accessibility and communications.
  Quality of infrastructure and building design.
  Strength of coastal defences.
  The extent of both primary and secondary effects may depend on several of these factors.

AO2 – 3 marks
AO3 – 3 marks

[6]

2.

Level	Marks	Description
3 (Detailed)	5 – 6	AO2 Shows thorough geographical understanding of the economic and social impacts of extreme weather event(s). AO3 Demonstrates coherent application of knowledge and understanding in analysing the social and economic impacts of extreme weather in the UK.
2 (Clear)	3 – 4	AO2 Shows some geographical understanding of the economic and/or social impacts of extreme weather event(s). AO3 Demonstrates reasonable application of knowledge and understanding in analysing the social and/or economic impacts of extreme weather in the UK.
1 (Basic)	1 – 2	AO2 Shows limited geographical understanding of the economic and/or social impacts of extreme weather event(s). AO3 Demonstrates limited application of knowledge and understanding in analysing the social and/or economic impacts of extreme weather in the UK.
	0	No relevant content.

- **Level 3** (detailed) responses will be developed. Some geographical terms will be applied. All aspects of the question are answered – social and economic impacts, use of figure and own understanding.
- **Level 2** (clear) responses are likely to have linked or elaborated statements and some use of geographical terms. Uses figure and/or own understanding.
- **Level 1** (basic) responses may comprise simple/partially inaccurate statements with very limited subject vocabulary. Partial sequence or random points made. Answers may depend largely on lifting material from the source.
- **Max L2** for explanation of social or economic impacts only.
- **Max L2** for general explanation of impacts without reference to the figure.
- There should be some (implied) reference to the figure to access Level 3.
- No credit for environmental impacts in isolation but allow if linked to social/economic effects e.g. River water contaminated with sewage brought health risks.

<u>Indicative content</u>

- The command word is “suggest” so responses should set out the likely impacts of extreme weather, making use of the figure.
- Extreme weather hazards may take place over one day or a period of time. In the UK these include storm events, flooding, severe thunderstorms and hailstorms, strong winds and tornadoes, droughts, extreme heat, extremes of cold weather including blizzards.
- Understanding of types of impact. Social – effects on people and communities. Economic – impacts on jobs, transport infrastructure, businesses and local and national economies.
- Social and economic impacts may overlap. Transport disruption can affect people’s daily lives but may have severe effect on transport of supplies and cause delays to employees.

- Credit understanding of social and economic impacts of specific weather events such as Cumbria floods (2009), St Jude storm (2013), Somerset Level floods (2014), drought/heatwave in 2003 and 2018, snow and ice in 2010 and March 2018. However reference to specific example is not needed for access to Level 3.
- Impacts depend on the nature of the event. Heatwaves may lead to pressures on water supplies (hosepipe bans, water shortages), risk to lives of frail and elderly people, danger of wildfires disrupting traffic and destroying farmland, increased food costs, buckling of railway lines and melting of roads. Credit positive social and economic effects including boost to tourism industry, sales of ice cream and cold drinks.
- Application of knowledge and understanding to the figure. Snow warnings indicate travel delays, road and rail closures (social and economic), power cuts (social and economic), potential risk to life and property (mainly social).
- The red warning in the photograph suggests major travel disruption which affects supplies of goods to shops and businesses (economic), possible closures of schools, increased chance of accidents and risk to life (social). Vehicles are stuck in traffic jams in both directions, including lorries carrying supplies.
- The caption suggests a cost of £1 billion per day. Credit broader implications of extreme cold including train, ferry and airline cancellations and delays (social and economic), damage to crops and losses of livestock in rural areas (economic), stoppages to certain industries such as construction (economic), loss of electricity supplies if power lines damaged (social and economic).

AO2 = 3 marks
AO3 = 3 marks

[6]

3.

Level	Marks	Description
3 (Detailed)	7 – 9	AO1 Demonstrates detailed knowledge of the impacts of tropical storms on people and the environment, with good use of exemplification. AO2 Shows thorough geographical understanding of places, environments and processes. AO3 Demonstrates application of knowledge and understanding in a reasoned way in evaluating the impacts of tropical storms on people and the environment, using source and example.
2 (Clear)	4 – 6	AO1 Demonstrates clear knowledge of the impacts of tropical storms on people and / or the environment, with some use of exemplification. AO2 Shows some geographical understanding of places, environments and processes. AO3 Demonstrates reasonable application of knowledge and understanding in evaluating some impacts of tropical storms on people and / or the environment, using source and / or example.
1 (Basic)	1 – 3	AO1 Demonstrates limited knowledge of impacts of tropical storms on people and / or the environment, with little or no exemplification. AO2 Shows slight geographical understanding of places, environments and processes. AO3 Demonstrates limited application of knowledge and understanding in evaluating impact(s) of tropical storms on people and / or the environment, using source and / or example
	0	No relevant content.

- **Level 3** (detailed) responses will be developed and include impacts affecting people and those affecting the environment (some may be interlinked). Impacts related to a named example and **Figure 5**, with some assessment.
- **Level 2** (clear) responses are likely to have linked statements, with some accurate use of geographical terms. May refer to named example. May start to evaluate impacts.
- **Level 1** (basic) responses are likely to consist of simple statements, with very limited use of subject vocabulary. May be limited to generic statements. May be limited to a single impact.

Indicative content

- The command is “to what extent”, so the focus of the question is an evaluation of the degree to which a tropical storm has effects on people and on the environment e.g. devastating, considerable, slight, limited. Responses may also consider their relative importance.
- Credit only effects (not causes). Answers should refer to the news report and photograph as well as a named example, although the two do not have to be balanced in coverage.
- Effects of storms may be categorised into people and the environment / primary and secondary effects / social and economic effects.
- Effects on people may include:
  people being killed or injured, bereavement, shock
  homes being destroyed
  transport and communication links not working
  infrastructure destroyed, so rescue efforts more difficult
  money needed urgently to rebuild
  shops and businesses damaged or destroyed
  looting and other crime
  local economy disrupted, including manufacturing and tourism
  reduced trade
  longer term health effects, insurance claims
  destruction of crops, loss of livestock (overlaps environmental effects)
  water pipes burst and water supplies contaminated (overlaps with environmental effects). May lead to disease risk.
- Effects on the environment may include:
  storm flooding large areas of the coast
  damage to coastal and river defences
  coastal habitats disrupted / disruption of ecosystems
  removal of forest
  changing the landscape near coastal areas
  heavy rainfall leading to mud / landslides
  sewage leaks, water pollution.
- Credit damage to built environment as well as natural environment.
- Credit positive effects on the environment e.g. tropical storms can bring rain to dry areas and move heat from the tropics to poles.
- Knowledge and understanding of specific example of a tropical storm e.g. Typhoon Haiyan. Wind speeds of up to 300 kilometres per hour. Effects on people. Strong winds destroyed homes. Over 6,000 people died. 4 million were made homeless. Power was interrupted, the airport was badly damaged and roads were blocked by trees. Tacloban was destroyed. Damage to rice and seed stocks. Farmers and fishers lost their income. Huge recovery costs for agriculture and fishing. Looting problems. Increased food prices. Risk of infection and spread of disease.
- Effect on Haiyan on environment. Five-metre storm surge along coast, fish were killed and forests destroyed, ecosystems were damaged by leaking sewage. Poor sanitation led to water pollution. Loss of forests and widespread flooding.
- Evaluation of the news report and photograph. Allow any reasonable inference from the photograph. Shows effects on people: e.g. roofs and walls of buildings blown away, some buildings destroyed, disruption to roads and other communications, damage to local economy, containers damaged, vehicles smashed and flooded, buildings under water, people made homeless / unemployed, effects on environment include flooding, risk of landslides, vegetation destroyed, pollution risk.

- Newspaper clip shows loss of human life, disruption of local community and widespread nature of destruction.
- Application of knowledge and understanding may include factors affecting effects on people and environment: e.g. intensity of the storm, speed of movement, distance from the sea, physical geography of coastal zone, the wealth of the country, population density, strength of coastal defences, degree of preparedness, local awareness, available technology, forecasting, storm warnings / monitoring systems, accessibility of location, quality of infrastructure and building design. The extent of impacts on people may depend on many of these factors.
- A purely generic answer without clear exemplification is limited to Level 2.
- An answer that lacks consideration of extent of impacts is limited to Level 2.

AO1 = 3 marks
AO2 = 3 marks
AO3 = 3 marks

Spelling, punctuation and grammar (SPaG)

High performance
- Learners spell and punctuate with consistent accuracy
- Learners use rules of grammar with effective control of meaning overall
- Learners use a wide range of specialist terms as appropriate.

3

Intermediate performance
- Learners spell and punctuate with considerable accuracy
- Learners use rules of grammar with general control of meaning overall
- Learners use a good range of specialist terms as appropriate.

2

Threshold performance
- Learners spell and punctuate with reasonable accuracy
- Learners use rules of grammar with some control of meaning and any errors do not significantly hinder meaning overall
- Learners use a limited range of specialist terms as appropriate.

1

No marks awarded
- The learner writes nothing
- The learner's response does not relate to the question
- The learner's achievement in SPaG does not reach the threshold performance level, for example errors in spelling, punctuation and grammar severely hinder meaning.

0

[12]

4.

Level	Marks	Description
3 (Detailed)	5 – 6	AO2 Shows thorough geographical understanding of the evidence for extreme weather in the UK. AO3 Demonstrates thorough application of knowledge and understanding in making a supported judgement about whether the weather in the UK is becoming more extreme.
2 (Clear)	3 – 4	AO2 Shows some geographical understanding of the evidence for extreme weather in the UK. AO3 Demonstrates reasonable application of knowledge and understanding in making a judgement about whether the weather in the UK is becoming more extreme.
1 (Basic)	1 – 2	AO2 Shows limited geographical understanding of the evidence for extreme weather in the UK. AO3 May include limited application of knowledge and understanding in making a judgement about whether the weather in the UK is becoming more extreme.
	0	No relevant content.

- **Level 3 (detailed) responses** will be developed responses with supporting evidence for answer. Appropriate use of Figure 1 (direct or inferred) and specific own understanding.
- **Level 2 (clear) responses** are likely to be linked statements with some elaboration. Some use of Figure 1 (direct or inferred) and own understanding.
- **Level 1 (basic) responses** will be simple statements with limited understanding or development. May consist of listed points, using information taken largely from Figure 1.

Indicative content

- The command is “do you agree” and so the focus of the question is an evaluation of the degree to which they feel weather events are becoming more extreme in the UK eg fully agree, partially agree, disagree.
- The question also requires the student to “support your answer” with reference to Figure 1 as well as their own understanding. Answers should therefore make some reference to Figure 1.
- Figure 1 shows examples of two extreme weather events – moorland fires and flooding. Whilst these only represent two extreme weather events, the text suggests that their occurrence is becoming more common.
- The effects on the people and/or environment from these two events are likely to have been significant compared to normal seasonal temperatures and rainfall totals in the UK.
- The moorland fires shown in Figure 1 can be linked to higher temperatures and lack of rainfall which have become more common in the UK in the summer months. Drought conditions like this make areas of dry land more vulnerable to fire (though actual ignition is often caused by human activities). These fires would likely have extreme economic, social and environmental impacts.
- The flooding shown in Figure 1 is the result of excessive and persistent rainfall which has become more common in the UK in the winter months. Flood events also have extreme economic, social and environmental impacts.
- Students may refer to examples of recent ‘extreme’ weather events in the UK including strong winds (Storms Ciara, Dennis 2020), drought and heatwaves, cold weather (Beast from the East 2018) and record rainfall and flooding (Cumbria 2009, Somerset Levels 2014, Shrewsbury 2020)
- Evidence from the Met Office suggests that the UK is experiencing more extreme weather events but that all weather is subject to great variability. However, there is evidence that more winter rain has fallen in heavy events since the 1980s and this has increased the frequency and magnitude of river flooding. Likewise, the UK has seen a temperature increase of 1 ^{o}C since 1980 which has been linked to hotter summers and greater chance of drought (although the latter also relies on lower seasonal precipitation totals).
- Students may discuss the need to look at long-term weather trends in order to decide whether the weather in the UK is becoming more extreme. They may rightly acknowledge that reference to only a handful of recent events is not evidence of a trend and that many parts of the UK are not experiencing significantly different weather patterns.

AO2 – 3 marks
AO3 – 3 marks

[6]

5. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Reference to any appropriate natural hazard acceptable.

One hazard/range of hazards/one key idea (buildings etc) acceptable.

Level 1 Basic (1–2 marks)

Basic points which include generic ideas (warn people/build barriers/tell people what to do). Largely descriptive.

Barriers can be built near rivers and people told when flooding likely.

Level 2 Clear (3–4 marks)

Clearer appreciation of planning with some explanation (earthquake – proof building/earthquake training days/emergency kits etc).

Putting barriers alongside rivers would mean that if river levels increased areas would not flood. Also floodwater could be diverted away from the areas which are most at risk. If fewer buildings were built near rivers risk would be reduced.

Level 3 Detailed (5–6 marks)

Detailed explanation which identifies a range of ideas which would reduce the effects of natural hazards.

Rivers can be managed by using barriers or widening rivers so that they can hold more water. Diverting flood water into holding ponds would reduce flooding. Planning strategies that did not allow building on riversides would reduce the threat of flooding and allow rivers to expand without causing problems.

[6]

6. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) Any two reasons (2 × 2)

1 mark basic point, 2nd mark, some explanation/development.
– more people in urban areas (1)
– more people living in hazardous areas (1)
– change to urban areas increases hazard risk (1) because of building in vulnerable areas (1)
– increasing numbers of hazards (1)
– shortage of building space (1) means increasing use of vulnerable areas (1)
– poorly constructed housing (1) cannot stand up to natural hazards (1)
– people may be made homeless (1) and this could lead to health problems (1)

4

(ii) Own knowledge implies knowledge of ideas or place.

Level 1 Basic (1–2 marks)
Basic ideas largely taken from resource with limited development.
Natural hazards like earthquakes can damage buildings and kill or injure people, especially if they live in poor areas.

Level 2 Clear (3–4 marks)
Clear idea which uses resource and brings in additional points. Wider ideas (generic or place based).
Hazards can damage buildings and ruin people's homes, especially in poor areas. People can lose everything or be hurt or even killed. In urban areas roads and railway lines can be destroyed and secondary hazards like fires, like after the Kobe earthquake, can devastate areas.

Level 3 Detailed (5–6 marks)
Detailed understanding which uses resources and brings in additional detail, exemplification. (Short/long term ideas / links to broader economy / infrastructure etc).
Because a lot of people live in a small area hazards can be devastating in urban areas. In poor countries like Egypt people can be killed and many homes are destroyed. Poorer people often lose everything and are affected by secondary problems like disease because water supplies are affected. Large scale hazards can disrupt transport and business, the Kobe earthquake in Japan caused the major highways and railway lines to be destroyed and thousands of people lost their jobs as factories were destroyed.

6

(iii) **Level 1 Basic (1–2 marks)**
Basic points with limited development and no real exemplification.
Risks can be reduced by building stronger houses and making sure people are prepared.

Level 2 Clear (3–4 marks)
Clear understanding of the idea. Ideas developed and some exemplification.
In some urban areas like Kobe and San Francisco earthquake proof buildings are built and people are educated about what to do if an earthquake strikes. Even in poor areas buildings can be built with cross-bracing so they don't collapse. Emergency services can also be trained to deal with hazards.

Level 3 Detailed (5–6 marks)
Detailed understanding with locational exemplification.
In Japan earthquake practice days are held and in San Francisco people are told what to do in the event of an earthquake and encouraged to have an emergency kit. Planning can help to ensure that buildings are not constructed in areas probe to flooding and landslides and buildings can be built to reduce risks from earthquakes and flooding. In many urban areas there are water channels which take flood water away from built up areas and in places like Dhaka there are flood embankments. London as the Thames Flood Barrier.

6

[16]

7. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

Issues should refer to the extent to which preparations are put in place and there is a readiness to deal with the effects. There may be reference to any type of extreme weather – with reference to the snow, there may be comment on the impact of the readiness of air, rail and road transport to cope with people being left stranded and the need to cancel flights and put people up. There may be debate about the amount of equipment needed and things such as salt and what scale of event we are ready for. Reference may be made to forecasting and warnings given and the extent to which these are accurate and heeded. Equally, there may be reference to how we deal with the impacts – how successful we are in rescuing trapped motorists, accommodate stranded travellers at airports and get things moving again. Positive aspects may be considered – such as snow for ski industry in Scotland and need for clothing / equipment.

Level 1 (Basic) (1–4 marks)
Simple statements, perhaps list-like at lower end.
Separate ideas – descriptive points (impacts) are included in a random order.
People were trapped in cars as snow closed roads. Airports shut and people had to stay there. Lots of schools closed, so children had lots of snow days. People could not get to the shops as roads had not been gritted.

Level 2 (Clear) (5–6 marks)
Develops statements and make links.
Relates negative impacts to preparation / how impacts dealt with to some extent – begins to identify / discuss issues.
Some illustration present.
Thousands of schools closed in Nov / Dec 2010 for many days and children enjoyed snow days, instead of being at school. Transport and safety issues led to closures that were part of a plan, but could roads have been gritted more. Airports in London were closed, but other countries get far more snow than we do and their airports do not close. We need more snow ploughs to keep runways open and de-icers to keep planes flying to reduce disruption caused.

Level 3 (Detailed) (7–8 marks)
Fully developed statements that are linked.
Clearly relates negative impacts to preparation / how impacts dealt with – discusses issues.
Details in exemplars used.
In Nov / Dec 2010 large amounts of snow caused problems for many people. Over 7000 schools closed, people were trapped in cars on M25, many trains were stuck between stations and major airports – London Heathrow and Gatwick were closed as there was too much snow on runways. Yet, we are supposed to prepare for such events. There was not enough equipment to keep the runways clear despite the efforts of 100 people and 45 snowploughs. Many roads were impassable as gritters struggled despite having ordered 350 000 extra tonnes of rock salt. Train operators failed to get information to passengers about delays and cancellations. So, should things have been better – the issue really is how much money we spend to be ready for an event that may occur very rarely – so that all the equipment is left idle and wasted.

AO1 – 4
AO2 – 4

[8]

8. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(a) Most hurricanes originate in the Atlantic Ocean, between 10°N and 30°N of the Equator. They have semi-circular / curved tracks, veering towards North America initially and then changing course and heading for the Atlantic. They vary in length with Gonzalo being the longest and Dolly the shortest. Only three of the hurricanes made landfall – Arthur, Bertha and Dolly. There are some exceptions to the general trend with Dolly forming in the Gulf of Mexico and having a much shorter track or Arthur with a straighter track.

3 × 1 per simple point, 1 + 1 for an elaborated point + 1

AO2 = 1
AO3 = 2

(b) Hurricane is symmetrical in cross section form, with the approaching section having a similar structure to the section after the eye. The greatest vertical extent of cloud is around the eye – the immediate section around the eye is the eyewall. Here, air is rising and there is a circular motion of the air around the eye. In the eye, there are no clouds and air is sinking. Around this central feature, there are columns of cloud visible of lower height than those around the eye. A diagram may be used to support the description and credit should be given for valid labels.

3 × 1 Any valid point, but there must be some reference to the central area – the eye for 3 marks.

AO1 = 3

(c) The cause of a hurricane must be explained by the conditions required for them to form and the sequence of events that occurs to lead to their occurrence. They form over warm tropical seas where temperatures are over 26.5/27 °C, usually in late summer and autumn when sea temperatures are at their highest. They form 5 °C N and S of the Equator where the characteristic spin can develop – this is due to the rotation of the Earth (Coriolis Force) – any nearer and the spin is not enough. Slight differences in air masses in the tropics and heating near the surface lead to the air being unstable and rising. Air over the oceans contains a lot of water vapour due to the high temperatures. As a result, when the air rises, it cools and condenses, releasing the stored energy – the latent heat. This powers the hurricane and as more and more water is evaporated, the storm gets bigger and stronger. Often, there are a number of separate storms which join together to form one larger hurricane and the rotation of the earth on its axis leads to the spin. Diagrams may be used in support and credit should be given for these.

AO1 = 6

Level	Marks	Description
2 (Clear)	5 – 6	The conditions for formation are linked to explanation. Statements are developed and linked. There is a sequence in clear explanation.
1 (Basic)	1 – 4	The explanation given is partial. May refer to conditions with implicit explanation. Statements are simple and separate and possibly in random order.
	0	No relevant content.

[12]

9.

Level	Marks	Description
3 (Detailed)	5–6	AO2 Provides a balanced discussion with well-developed ideas through a detailed understanding of the issue. AO2 Demonstrates thorough understanding of the evidence for increasingly extreme weather in the UK.
2 (Clear)	3–4	AO1 Provides range of accurate knowledge about weather conditions, referring to specific events in the UK over recent years. AO2 Shows a reasonable understanding of the evidence for increasingly extreme weather in the UK
1 (Basic)	1–2	AO1 Shows limited generic knowledge, with little or no specific detail about UK weather events. Answers are not developed. AO2 Demonstrates some understanding of the issue, with random statements about weather conditions, but with limited link to the evidence for increasingly extreme weather.
	0	No relevant content.

Indicative content

- Allow reference to a wide range of extreme weather types, including droughts, severe gales, heavy snowfall and blizzards, hailstorms, thunderstorms, intense rain leading to flooding.
- There should be description of specific weather conditions and an indication of how the weather has become more extreme.
- Answers may refer to the increasing frequency of these extreme events, the high levels of rainfall, intensity of wind, high temperatures, although these may not be indicative of long-term changes in themselves.
- Credit reference to specific extremes of temperatures and rainfall in recent years in the UK. E.g. 2003 hot summers; 2010 very low temperatures and much snowfall; 2012 wettest summer on record in England; summers of 2013 and 2014 were amongst the warmest and sunniest in recent years; the Somerset Levels were severely flooded due to heavy persistent rainfall in 2014, with many parts inaccessible for several weeks.

AO1 = 2
AO2 = 4

[6]

10.

Level	Marks	Description
3 (Detailed)	7 – 9	AO1 Demonstrates comprehensive and accurate knowledge of the factors involved in reducing the effects of tropical storms. AO2 Demonstrates a thorough understanding of how prediction, planning and preparation can reduce the effects of tropical storms. AO3 Demonstrates sound application of knowledge and understanding in a reasoned way to make a judgement about the relative importance of prediction in reducing the effects of tropical storms.
2 (Clear)	4 – 6	AO1 Demonstrates specific and clear knowledge of the factors involved in reducing the effects of tropical storms. AO2 Demonstrates some understanding of how prediction, planning and preparation can reduce the effects of tropical storms. AO3 Demonstrates some application of knowledge and understanding to evaluate the relative importance of prediction in reducing the effects of tropical storms.
1 (Basic)	1 – 3	AO1 Shows limited knowledge of the factors involved in reducing the effects of tropical storms. AO2 Shows limited understanding of how prediction, planning and preparation can reduce the effects of tropical storms. AO3 Shows limited application of knowledge and understanding and makes a simple evaluation about the relative importance of prediction in reducing the effects of tropical storms.
	0	No relevant content.

Indicative content

- The command is ‘Assess the extent’, so the focus of the question is an evaluation of the relative importance of prediction in reducing the risks associated with tropical storms.
- Students might consider a range of important factors, including prediction, preparation and planning.
- The discussion might lead to a number of evaluative ideas which might include; observations which suggest that one factor is more significant than another; observations which might suggest that all factors are equally important or that they are linked; observations that individual factors may be more significant in different circumstances. Any type of appropriate evaluative focus is acceptable.

AO1 = 3
AO2 = 3
AO3 = 3

Spelling, punctuation and grammar (SPaG)

High performance
- Learners spell and punctuate with consistent accuracy
- Learners use rules of grammar with effective control of meaning overall
- Learners use a wide range of specialist terms as appropriate

3

Intermediate performance
- Learners spell and punctuate with considerable accuracy
- Learners use rules of grammar with general control of meaning overall
- Learners use a good range of specialist terms as appropriate

2

Threshold performance
- Learners spell and punctuate with reasonable accuracy
- Learners use rules of grammar with some control of meaning and any errors do not significantly hinder meaning overall
- Learners use a limited range of specialist terms as appropriate

1

No marks awarded
- The learner writes nothing
- The learner's response does not relate to the question
- The learner's achievement in SPaG does not reach the threshold performance level, for example errors in spelling, punctuation and grammar severely hinder meaning

0

[12]

11.

Level	Marks	Description
3 (Detailed)	7 – 9	AO1 Demonstrates detailed knowledge of immediate and long-term strategies used in response to tropical storms, with secure use of detailed exemplification AO2 Shows thorough geographical understanding of the interrelationships between places, environments and processes in the context of a tropical storm. AO3 Demonstrates application of knowledge and understanding in a coherent and reasoned way in evaluating a wide range of responses to tropical storms
2 (Clear)	4 – 6	AO1 Demonstrates clear knowledge of immediate and / or long-term strategies used in response to tropical storms, with some use of exemplification. AO2 Shows some geographical understanding of the interrelationships between places, environments and processes in the context of a tropical storm. AO3 Demonstrates reasonable application of knowledge and understanding in evaluating some responses to tropical storms
1 (Basic)	1 – 3	AO1 Demonstrates limited knowledge of immediate and / or long-term strategies used in response to tropical storms, with little or no exemplification. AO2 Shows slight geographical understanding of the interrelationships between places, environments and processes in the context of a tropical storm. AO3 Demonstrates limited application of knowledge and understanding in evaluating responses to tropical storms
	0	No relevant content.

Indicative content

- **Level 3** will be a well-developed answer. Classifies responses into immediate and long-term. Must contain a named example, with clear assessment. Evaluates responses.
- **Level 2** Linked or elaborated statements, accurate use of geographical terms. May classify into immediate and long-term and assess a range of responses to tropical storms. May refer to named example. May start to evaluate responses.
- **Level 1** responses are likely to consist of simple statements, with limited use of subject vocabulary. May be limited to generic statements, a list of strategies without development or classification. May be limited to a single strategy. May make a limited evaluation.
- The command is to “evaluate”, which means to consider a mix of responses to tropical storms and weigh them up so as to come to a conclusion about their effectiveness, degree of success or validity.
- Responses to storms should be categorised into immediate and long-term. Strategies adopted may depend on the types of effects: social, economic or environmental. Responses to storms may vary depending on whether the impacts are primary or secondary. Credit distinctions between responses in HIC and LICs / NEE countries and between urban and rural settings.

- Understanding of human factors affecting responses: population density, urbanisation of the population, poverty, strength of infrastructure, education, effectiveness of government, disaster planning.
- Understanding of physical factors affecting responses: intensity of the storm, speed of movement, distance from the sea, physical geography of coastal impact zone.
- HICs and some NEEs may have resources and technology, such as satellites and specially equipped aircraft, to predict and monitor the occurrence of storms. They are also equipped to train the emergency services appropriately and to educate people about necessary precautions. Storm warnings can be issued to enable the population to evacuate or prepare themselves for the storm. People can prepare by storing food and water or boarding up their windows.
- Immediate responses may include evacuation of people before storm arrives, rescue people cut off by flooding, set up temporary shelters, provide supplies of food, water, gas, electricity supplies, recover dead bodies to reduce disease risk, NGOs provision of aid workers, supplies, equipment.
- Long term responses may include repair of homes, rehousing programmes, repair of damaged infrastructure, improved forecasting techniques, improved flood defences, promotion of economic recovery, improved building regulations, changed planning rules to avoid most vulnerable areas.
- Understanding how different groups of people respond to tropical storms, including individuals, organisations, local governments, the national government and international aid organisations / foreign governments.
- Individuals can construct makeshift flood defences to prevent their land from being flooded (e.g. sandbags).
- Local governments ensure that education is provided and messages are given to locals to warn residents about potential hazards such as flooding and contaminated drinking water supplies.
- Organisations identify hazard-prone areas at risk of flooding / environmental damage.
- The national government ensures that relevant monitoring bodies produce the necessary information in forecasting the weather. It may mobilise military or emergency aid resources to prepare flood defences, evacuate people, respond to contamination, and protect crops and wildlife.
- Knowledge and understanding of specific example of a tropical storm e.g. Haiyan. Immediate / emergency responses. Government evacuated over 1 million people-over 1200 evacuation centres. Many sought refuge in an indoor stadium in Tacloban but some died when it was flooded. The government sent essential equipment and medical supplies to some regions. Emergency aid supplies arrived three days later by plane once the airport was reopened. It was a week before power was restored in some regions and partially in others. Within two weeks, over one million food packs and 250,000 litres of water were distributed. $1.5 billion in foreign aid. A curfew was imposed two days after Typhoon Haiyan to reduce looting.
- Longer term responses included rebuilding of roads, bridges and airport. Rice farming and fishing quickly re-established. Aid agencies helped to fund new fishing boats. Thousands of homes built away from flooded areas. More cyclone shelters. New storm surge warning system ‘Build Back Better’ -buildings upgraded with improved protection. Mangroves replanted. Plans to build new road dike.
- Assessment / evaluation of different types of response. Individual responses have a relatively small impact on reducing damage. People may be able to protect their own land or property but not much beyond that. National governments can have the biggest impact because they have the resources, capacity and authority to respond to economic, social and environmental effects on a large scale. Aid organisations may focus on social impacts (safety, food, shelter), but will often invest in longer term projects and solutions.

- Effectiveness of responses may be determined by many factors, including available technology, infrastructure, communications, remoteness of area affected, degree of preparedness, monitoring systems, capacity of emergency services, education, building design. The distinction between HIC and NEE responses can be over-simplistic. Some poorer countries such as Bangladesh have early warning systems, tracking, cyclone shelters, coastal defences which have reduced death tolls considerably.
- Reject discussion of impacts unless directly related to responses.
- A purely generic response without clear exemplification is limited to Level 2.
- A response that lacks evaluation of responses is limited to Level 2.

AO1 = 3
AO2 = 3
AO3 = 3

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[12]