

KNOWLEDGE ORGANISER

WORLD STUDIES

KS4 Geography

Topic 1: Hazards Earth EQ2

Name:

Class Teacher:

Big Question	Task	Due Date
2	Exam questions (set end of lesson 2)	
4	Retrieval questions ready for test Lesson 5	
6	Seneca & revision cards	



TABLE OF CONTENTS

1. What meteorological conditions cause the formation of tropical cyclones?
2. What are the physical hazards of tropical cyclones and their impacts?
3. Why are some countries more vulnerable to the impacts of tropical cyclones?
4. How can countries prepare and respond to tropical cyclones?
5. How do you answer the longer mark evaluate questions?

EXAM STRUCTURE & CASE STUDIES

Paper 1: Global Geographical Issues (37.5%)

- ❑ Topic 1: Hazardous Earth
- ❑ Topic 2: Development dynamics
- ❑ Topic 3: Challenges of an urbanising world

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions

Paper 2: UK Geographical Issues (37.5%)

- ❑ Topic 4: The UK's evolving physical landscape
- ❑ Topic 5: The UK's evolving human landscape
- ❑ Topic 6: Geographical investigations

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions in Topic 4 and 5

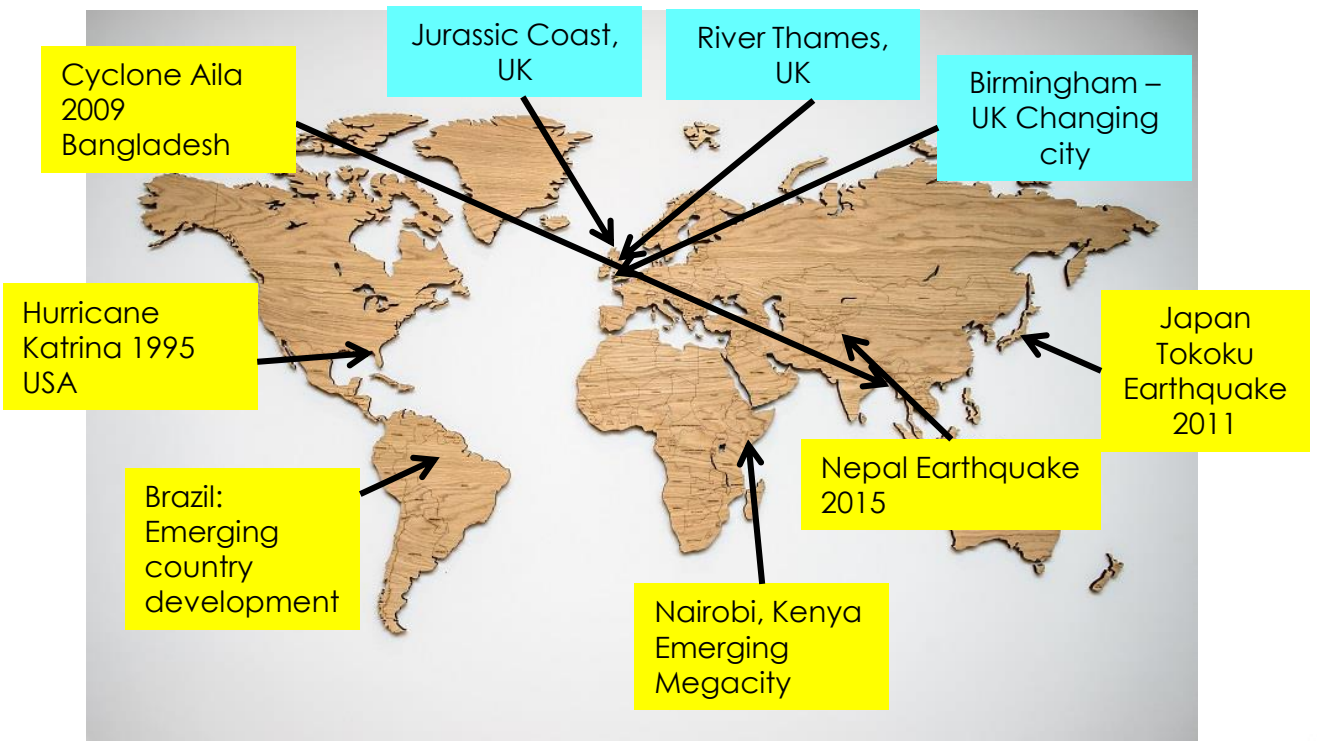
Topic 6: Answer Q 8 & Q10

Paper 3: People and Environment Issues – Making Geographical Decisions (25%)








- ❑ Topic 7: People and the biosphere
- ❑ Topic 8: Forests under threat
- ❑ Topic 9: Consuming energy resources

Written examination, 1 hour and 30 minutes, 64 marks.

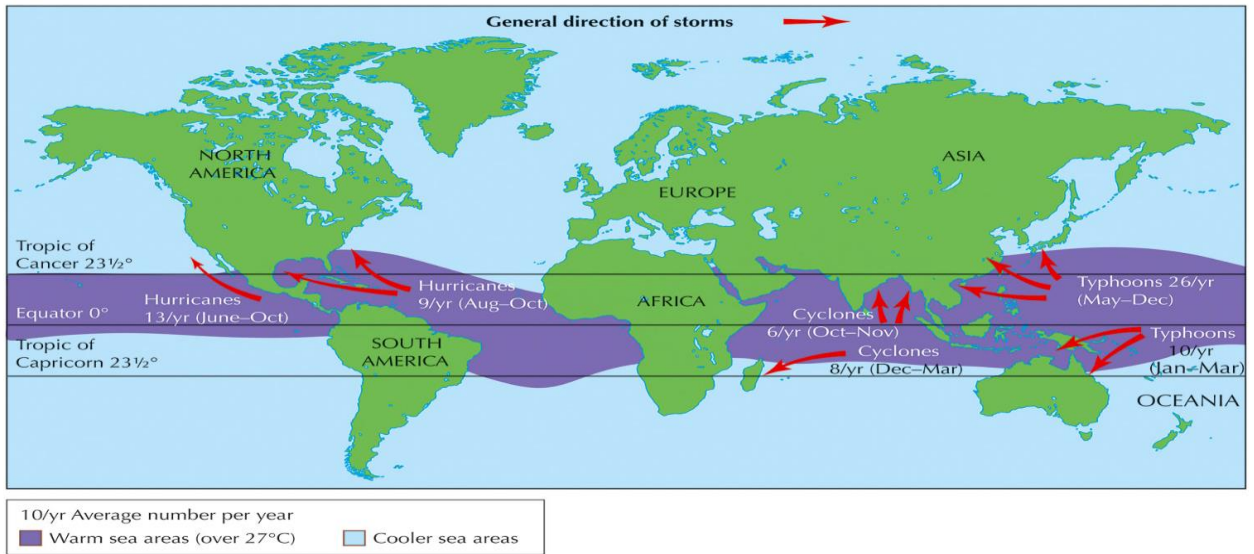
Answer all questions



GLOSSARY

Key term	Icon	Definition
Atmospheric circulation		The movement of air within the Polar, Ferrel and Hadley Cells controlled by radiation from the sun.
High pressure		The 'weight' of sinking air exerts more pressure on the ground and an area of high pressure is formed causing areas to become arid
Low pressure		The warmth of the Earth's surface causes air to rise, exerting less pressure on the ground forming low pressure causing rainfall.
Short-term relief		Immediate support that includes rescuing people, providing medical aid, and restoring water and electricity.
Storm surges		A tropical cyclone creates a large area of low pressure, which allows the level of the sea to rise.
Tropical cyclones		A tropical cyclone creates a large area of low pressure, which allows the level of the sea to rise
Warning strategies		Forecasting, monitoring and prediction that allows advance warnings for preparation and evacuation.

BQ1: WHAT METEOROLOGICAL CONDITIONS CAUSE THE FORMATION OF TROPICAL CYCLONES?



- ❑ Tropical storms are usually found between 5° and 30° north and south of the Equator.
- ❑ Higher **insolation** means temperatures are higher than at the poles.
- ❑ The sea temperature must be above 27°C, to a depth of approximately 60–70 metres.
- ❑ Provides the heat and moisture that causes the warm air to rise rapidly in this low-pressure region. Latent heat is then released which powers the tropical storm.

Formation:

1. Moist air is heated and evaporates creating low air pressure
2. Strong winds form as rising air draws up more moisture
3. Winds start to spin due to the Coriolis effect
4. Rising air condenses and forms cumulonimbus clouds and convectional rainfall
5. The low air pressure system travels across the ocean in the direction of the prevailing winds

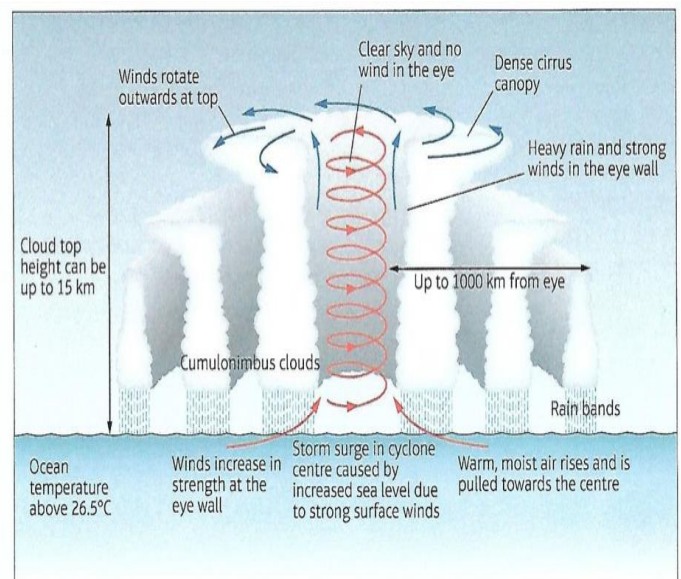


Figure 16 The structure of a tropical cyclone

LESSON 3 BIG QUESTION: WHAT ARE THE PHYSICAL HAZARDS OF TROPICAL CYCLONES AND THEIR IMPACTS?

What are the effects of a tropical storm?

Tropical storms have significant effects on people and environments.

- **High winds** – Tropical cyclones produce winds of between 119-250km/hr or more. Trees can be uprooted by the force of the wind and infrastructure like power cables damaged. The strongest winds can severely damage or destroy buildings, especially if they are poorly built.



Intense rainfall – As tropical cyclones move over the ocean they take up a large amount of water, this results in a large release of rain. Intense rainfall can lead to flooding, damage to property and injury, as fast-flowing water can knock people over, even if it is not particularly deep.



Storm surges – A tropical cyclone creates a large area of low pressure, which allows the level of the sea to rise. When this is combined with the high winds produced by the storm, a large mass of water can be forced towards the land by the strength of the wind. When the surge hits land, it does so with severe force.



Coastal flooding – The combination of intense rain and storm surges puts coastal areas at severe risk of flooding. Not only does this put people and property at risk, but it also affects the farming and tourism industries.



Landslides – intense rainfall affects areas of high relief as well as coastal lowlands. High levels of rain can **saturate** the soil very quickly. This makes the soil very heavy and, in areas with steep slopes, can mean that the soil will no longer be able to hold its position and will start to slide down the slope. The **geology** of an areas is very significant. For example, where the underlying rock is impermeable, the wet soil and rock above can easily slide over it and downhill.

BQ4: WHY ARE SOME COUNTRIES MORE VULNERABLE TO THE IMPACTS OF TROPICAL CYCLONES?

There are three types of vulnerability to tropical cyclones:

1. Physical vulnerability

- ❑ As tropical cyclones form over water, coastal areas are at significantly more risk of being affected by tropical cyclones than inland areas.
- ❑ Island nations, such as the Philippines and the Maldives, have most of their settlements in low lying coastal regions
- ❑ Areas of low relief will be at risk not only from high winds and rain, but also from the storm surges created by the tropical cyclones, making flooding more likely
- ❑ Areas of high relief are more at risk from the heavy rain that the storm surge, as this can cause landslides, particularly in the steepest areas.

2. Social vulnerability

- ❑ Areas of poverty are more likely to be vulnerable, as housing and other construction may not be of a high standard and more easily damaged or destroyed.
- ❑ The after-effects of a tropical cyclone are also felt more in poorer areas as people may not have access to shelter, food, clean water and medical care
- ❑ Areas with a population of higher or lower average age are more vulnerable to tropical cyclones as older people and young people are more likely to suffer injury during disasters and have more difficulty in evacuating the affected area.

3. Economic vulnerability

Countries with high levels of development are more likely to have:

- ❑ Access to the most accurate weather prediction and modelling data. Being able to predict the tropical cyclone's landfall and prepare for it.
- ❑ Coastal defences, meaning that their coastal areas will be less affected by storm surges and the damage caused by the tropical cyclone will be greatly reduced.
- ❑ Well-established evacuation procedures and disaster response teams. Poor countries often have to wait for international aid agencies to help them rescue tropical cyclone survivors. Supplies of food, clean water and medicine are also more likely to be available.



HURRICANE KATRINA VS CYCLONE AILA

VULNERABILITY

	Hurricane Katrina 2005	Cyclone Aila 2009
Physical vulnerability	<ul style="list-style-type: none">❑ Category 5❑ 6m high storm surge❑ Wetlands used to protect New Orleans – drained due to flood prevention methods on the Mississippi upstream	<ul style="list-style-type: none">❑ 80% of Bangladesh is less than 10m above sea level, 10% is below 1m❑ Contains 3 of the world's largest rivers – annual flooding❑ Only receives 5% of the world's cyclones each year❑ 4.5-6m high storm surge❑ Category 1
Social vulnerability	<ul style="list-style-type: none">❑ Ethnic groups, elderly, children struggled to access resources❑ Wealthy had independent resources and ability to evacuate.	<ul style="list-style-type: none">❑ 31% of population live below the poverty line❑ Poorest forced to live on cheaper flood-prone land
Economic vulnerability	<ul style="list-style-type: none">❑ 20 weather satellites operate each day through the National Hurricane Centre – these are ageing❑ Phone access is high (103 per 100) so warnings are received❑ Defences (embankments) designed for category 3 storm	<ul style="list-style-type: none">❑ GDP per capita \$2100 (2013)❑ Few people outside the capita Dhaka have access to TV and radio❑ Mobile phone ownership 50 per 100



HURRICANE KATRINA VS CYCLONE AILA

IMPACTS

	Hurricane Katrina 2005	Cyclone Aila 2009
Social	<ul style="list-style-type: none"><input type="checkbox"/> 1800 people killed<input type="checkbox"/> 1.3 million evacuated<input type="checkbox"/> 500 000 homeless<input type="checkbox"/> Drinking water contaminated for 5 months<input type="checkbox"/> 1 million homes damaged	<ul style="list-style-type: none"><input type="checkbox"/> 190 people killed<input type="checkbox"/> 750 000 homeless<input type="checkbox"/> 90% of those displaced were from the lowest income groups
Economic	<ul style="list-style-type: none"><input type="checkbox"/> Estimated damage \$108 billion<input type="checkbox"/> 230,000 people lost jobs<input type="checkbox"/> Some insurance companies have stopped insuring homeowners in the area because of the high costs	<ul style="list-style-type: none"><input type="checkbox"/> 59 000 animals killed, so lack of food and income<input type="checkbox"/> 3.5 million people affected losing homes or livelihoods<input type="checkbox"/> People forced to migrate to Dhaka for work – slums<input type="checkbox"/> Approx. \$1 billion in damage
Environmental	<ul style="list-style-type: none"><input type="checkbox"/> 80% of New Orleans was flooded<input type="checkbox"/> 16 National Wildlife Refugees closed<input type="checkbox"/> 7 million gallons of oil leaked due to damage to oil facilities.	<ul style="list-style-type: none"><input type="checkbox"/> Loss of animals = loss of dung, a source of cooking fuel = deforestation<input type="checkbox"/> Sickness and typhoid due to contaminated water (sewage)<input type="checkbox"/> Sundarbans (mangrove forest) affected

BQ5: HOW CAN COUNTRIES PREPARE AND RESPOND TO TROPICAL CYCLONES?

Preparing for a tropical cyclone depends upon accurate forecasting and then effective communication to people who might be at risk.

Atmospheric pressure

Measuring atmospheric pressure is the most common forecasting method and is the one that gives the earliest information on a potential tropical cyclone hazard. Areas of very low pressure are likely source areas for tropical cyclone formation. The problem is that oceans cover large areas and atmospheric pressure readings need to be made locally. To do this, buoys have been anchored in tropical ocean areas which send pressure readings (they also measure wind speeds). Ships also record pressure and other weather data and send these readings to shore.

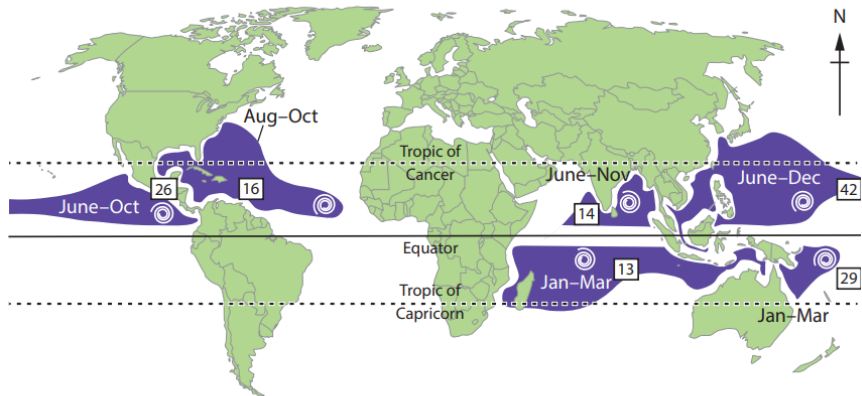
When a tropical cyclone gets closer to land, atmospheric readings enable forecasts to be made about possible storm surges. Some countries fly special planes through the upper layers of the tropical cyclone to take very accurate pressure readings to help make these forecasts more accurate.

Satellite tracking and radar

Satellite technology allows huge areas of ocean to be monitored for the formation of distinctive tropical storm cloud formations. The progress of the tropical cyclone can then be tracked in real time as it moves over the ocean towards a possible landfall. Once a tropical cyclone has developed an eye, it is easy to spot on satellite images, but in their early stages it is difficult to distinguish them from other weather systems because of their cirrus cloud canopy. Like satellite images, radar can also provide information from a distance. Radar registers large banks of precipitation, so it can provide information on rainfall levels. However these are expensive

HOMWORK 1

(c) Study Figure 2, which is a map showing the distribution of tropical cyclone source areas and the number of tropical cyclones in 2018.



Key:

- Source areas of tropical cyclones
- 16 Number of tropical cyclones in the source area in 2018
- June–Oct Months when tropical cyclones are most likely

- A** June–Oct
- B** Aug–Oct
- C** Jan–Mar
- D** June–Dec

1) Identify the period when tropical cyclones are most likely to affect the East coast of the USA. (1)

2) There was a global total of 140 tropical cyclones in 2018.

Calculate the percentage of tropical cyclones occurring in the northern hemisphere in 2018. (2)

Show your working.

..... %

3) Using Figure 2, explain the distribution of tropical cyclone source areas. (3)

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HOMWORK 2

Try to answer all of these key knowledge questions. Then check your answers using the answer page. These are some of the questions that will be in the knowledge quizzes and the mid and end of unit tests.

Key knowledge question	Your answer
What is the global distribution of tropical storms?(2)	
What is needed for a tropical storm to form? (3)	
How does a tropical storm form? (5)	
What happens when a tropical storm approaches land? (3)	
What are the features of a tropical storm? (2)	
Why do tropical storms spin? (1)	

HOMWORK 2

Key knowledge question	Your answer
What are the conditions like in the eye of the storm? Why? (3)	
What directions do tropical storms spin in? (4)	
How is a tropical storm measured? (1)	
What are the primary effects of a tropical storm? (3)	
What are the secondary effects of a tropical storm? (3)	
What is a storm surge? (2)	
How can a tropical cyclone cause a landslide? (2)	

HOMWORK 3

You should complete revision in preparation of your end of topic test. This includes:

1. Completing the SENCA revision work as outlined on class charts.
2. Producing revision cards on the key areas outlined below:

Key content	Revision notes completed	Revised?
I know the distribution of tropical storms		
I can explain the causes of a tropical storm		
Using named examples (Hurricane Katrina & Cyclone Aila), I can describe and explain the primary and secondary impacts of tropical storms.		
I can assess and evaluate methods of responses tropical storms in both the long and the short-term using named examples (Hurricane Katrina & Cyclone Aila).		
I can explain how tropical storms might be affected by global warming.		
I can explain how monitoring, planning and prediction of tropical storms can reduce their effects.		

Video resources:

<https://www.youtube.com/watch?v=2pbkUVQLchE>

KEY KNOWLEDGE QUESTIONS

Key knowledge question	Your answer
What is the global distribution of tropical storms?(2)	Between 5-23.5 degrees North and South of the Equator (1) between the Tropic of Capricorn/Cancer (1)
What is needed for a tropical storm to form? (3)	Warm oceans with temperatures between 26-27c (1) moisture from water/ heat to make the air unstable/ high humidity/rapid cooling to generate huge amounts of energy/low wind shear/Coriolis effect
How does a tropical storm form? (5)	<ul style="list-style-type: none"> • Moist air is heated and evaporates creating low air pressure (1) • strong winds form as rising air draws up more moisture (1) • Winds start to spin due to the Coriolis effect. (1) • Rising air condenses and forms cumulonimbus clouds and convectional rainfall (1) • the low air pressure system travels across the ocean in the direction of the prevailing winds (1)
What happens when a tropical storm approaches land? (3)	Loses energy (1) as it no longer has warm-water supply (1) and slows down due to friction with land (1)
What are the features of a tropical storm? (2)	Circular in shape (1) winds spiral around the centre of the storm/eye (1)
Why do tropical storms spin? (1)	Coriolis effect (rotation of the earth)
What are the conditions like in the eye of the storm? Why? (3)	Calm, gentle winds and clear skies (1) because of cold air sinking (1) creating high pressure (1)

KEY KNOWLEDGE QUESTIONS

Key knowledge question	Your answer
What directions do tropical storms spin in? (4)	In the northern hemisphere they bend to the east (1) air and clouds spin anticlockwise (1) southern hemisphere they bend to the west (1) air and clouds spin clockwise (1)
How is a tropical storm measured? (1)	Saffir-Simpson scale on 1-5 based on wind speed
What are the primary effects of a tropical storm? (3)	Death/injury/destroyed buildings/homelessness/flooding/damaged infrastructure
What are the secondary effects of a tropical storm? (3)	Landslides/waterborne diseases/looting/food and water shortages/damage to businesses/trade/tourism
What is a storm surge? (2)	Wind pushes the sea onto the land (1) flooding low-lying coastal areas (1)
How can a tropical cyclone cause a landslide? (2)	Heavy intense rainfall saturates soil (1) making the slopes unstable (1)



Question 1: Impacts of extreme weather hazards

Always read the question carefully before you start writing your answer. Make sure you are clear about what the topic of the question is.

In this question, up to four additional marks will be awarded for your spelling, punctuation, grammar and use of specialist terminology.

Assess the view that coastal flooding is the main physical hazard caused by tropical cyclones. **(8 marks)**



Structuring your answer

- 1** **Point** - identify your first impact
 - This needs to be one sentence that is clear and concise
 - **Connectives:** Firstly/Secondly/Finally or On one hand/On the other hand/Overall or To begin with
- 2** **Explain** your first impact. Use the so what effect.
 - Always go into detail, aim for 2-3 sentences
 - **Connectives:** This means that, Therefore, This links to, This causes, Consequently
- 3** **Evidence**
 - Give an example or some evidence – the more specific you are, the better you will perform overall.
 - **Connectives:** For example/For instance, Such as, This links to, As seen by/in
- 4** **Counter argument (be critical)**
 - You should be critical i.e. consider counter arguments to your initial point
 - **Connectives:** However, On the other hand, Although, Alternatively
- 5** **Evaluation** (link to the question)
 - This is where you link your paragraph back to the question by stating what you think overall and how your response answers the question
 - **Connectives:** Overall, To summarise, In conclusion, I believe that, Ultimately

Level 1	1-3	<ul style="list-style-type: none"> • Demonstrates isolated elements of understanding of concepts and the interrelationship of places, environments and processes. (AO2) • 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 are supported by limited evidence. (AO3)
Level 2	4-6	<ul style="list-style-type: none"> • Demonstrates elements of understanding of concepts and the interrelationship of places, environments and processes. (AO2) • 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)
Level 3	7-8	<ul style="list-style-type: none"> • Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2) • 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)

Assess the view that coastal flooding is the main physical hazard caused by tropical cyclones. (8 marks)



Coastal flooding is the main physical hazard caused by tropical cyclones. This is because flooding could cause destruction of infrastructure in urban areas increasing the number of injuries and deaths. Also in third world countries flooding caused by cyclones could damage crops which is vital for survival. Furthermore, this leads to secondary impacts such as increased job losses, homelessness rates which could lead to increased poverty rates.

However the wind speeds caused by tropical cyclones may be the main physical hazard. This is due to the mass destruction they cause e.g. destroying homes and blowing cars away. Also it is the high level winds which play a role in causing the flooding by breaking embankments and levees holding the water, causing flooding.

In conclusion, I believe wind speeds caused by the tropical cyclones is the main physical hazard. This is because they play a role in most physical hazards caused by the cyclone e.g. flooding.

What score would you give this and why?



**Think-pair-
share**

Assess the view that coastal flooding is the main physical hazard caused by tropical cyclones.

landslides, tsunamis
storm surges

(8)



Tropical cyclones are deadly areas of rising low pressure around a destructive eye of low pressure. These cyclones can force water upwards, hence catalysing a storm surge such as the 7.6m one in Myanmar, Burma in 2008. In turn, such forceful surge ~~into~~ ~~are~~ ~~is~~ ~~are~~ coastal flooding. Coastal flooding could be viewed as the main physical hazard caused by tropical cyclones, as not only does it directly kill people by drowning, but it also destroys buildings and homes. Such hazards are augmented in developing countries: Cyclone Nargis hit Myanmar in May 2008, causing 138 666 deaths. Due to the weak infrastructure of the country, the 7.6m storm surge simply tore down buildings and homes, hence catalysing mass homelessness. Not only that, but coastal flooding catalysed devastating secondary impacts as the 2.5 million people affected didn't have the money to rebuild after the category 5 cyclone, hence evidencing the severe physical hazard of coastal flooding. Furthermore, coastal flooding does not only impede on developing countries: In August 2005, Hurricane Katrina hit New Orleans, imparting mass destruction. The principal reason for the 1836 deaths was coastal flooding: the water simply burst through the unmaintained levees and flooded the ancient pumping systems. ~~As~~ In turn, such flooding catalysed the main bridge route into New Orleans to collapse: not only did this mean people became trapped in the poorer suburbs, but it also meant that aid could not come into the city, hence fuelling the death toll. ~~As~~ Therefore, this evidences the pivotal hazard coastal flooding is as it not only devastates developing countries, but it also impacts chaos into developed countries also.

However, another important physical hazard caused by tropical cyclones is landslides. When the force of the around 175 mph winds hit, unstable land can be displaced. In turn, this can cause further deaths and destruction of homes as people who are already panicked may be unaware of falling land from above. However, this is of lesser significance than coastal flooding as landslides are provoked by such flooding: when the earth becomes saturated with water, it is more likely to slump and slide. In turn, this evidences how such physical

hazard is simply fuelled by coastal flooding, therefore evidencing its diluted importance

as a hazard caused by tropical cyclones. Moreover, another physical hazard caused by

tropical cyclones is the augmented risk of spread of disease. When buildings are destroyed, especially in developing countries where sanitation systems are sparse, many people end up closely packed together in refugee camps or simply on the streets: in Myanmar, one million people were left homeless with only little aid from neighbouring governments. Due to the close proximity, disease spread like wildfire that was simply incurable due as there was a lack of healthcare, hence magnifying the over 130,000 people already dead. However, this holds lesser significance than coastal flooding as it typically only impinges on developing countries who cannot afford healthcare and for the most part is catalysed by external factors such as wind shear and flooding that destroy homes.

Overall, despite landslides and disease holding importance, I believe that coastal flooding is the main physical hazard caused by tropical cyclones. Not only does it affect developing countries, but it also formed the foundation on which the destruction of Katrina in the USA was built upon. Furthermore, it acts as a hazard such as landslides as it saturates the earth, hence evidencing my opinion.

Results Plus: Examiner Comments

This is an excellent response to this question, which scores 8 marks with 4 for spelling, punctuation, grammar and specialist terminology.

It contains an excellent level of understanding covering some of the different hazards associated with tropical cyclones (AO2) and offers assessment regarding their relative significance throughout the response, making judgments regarding their impacts which are fully evidence based (AO3).

The answer is somewhat lengthy, perhaps reflective of the additional time candidates had to formulate responses in the 2022 series. Whereas the additional material outside of the lined area allocated for the question is very well-written, sufficient AO2 and AO3 material has been included within the lined area to score the full 12 marks.

Note, that SPAGT does not have to be perfect to score the full 4 marks.

Results Plus: Examiner Tip

Remember to make judgments to score AO3 marks. In assess questions, these are commonly obtained by deciding which factors are the most important in your answer. Also, back up your judgments with evidence – this means including case study material.