

Oxford Revise | Geography | Answers

Chapter 3 Tropical cyclones

All exemplar answers given are worth full marks.

1.
 - a) D
 - b) Cyclones in Indian Ocean; hurricanes in Caribbean Sea
 - c)
 - i) 1:25
 - ii) 1:31
 - iii) Hurricane Sandy hit the USA, which is rich and highly developed. It is better prepared to cope with a tropical storm and the population is more mobile and benefits from accurate warnings allowing effective evacuation, which means that fewer people are killed. The excellent infrastructure and medical facilities mean that if people manage to survive the primary effects of the storm itself, they are less likely to die of the longer-term secondary effects because they can get to a hospital quickly, unlike in the Philippines. However, the value of property and businesses and the costs of repair are much higher in the USA, which explains why the economic cost is much more than in the Philippines.
 - d) The eye is in the centre of a tropical cyclone where there is a column of rapidly sinking air and the weather is calm with cloudless skies.
 - e) The social impacts of a tropical storm will impact people. Some will die or suffer injuries from flying debris. People who survive may lose their homes or have no insurance for repairs. They may become isolated if communications are destroyed, and damage to the water and sewage infrastructure may result in disease because of contaminated water. Economically, people's income will suffer if they lose income from farming when crops are destroyed. They will have repair costs to their homes and taxes may have to go up to provide money for the government to repair the country's infrastructure.

f) This question is level-marked:

Level	Marks	Description
3	6–8	<ul style="list-style-type: none"> • Accurate understanding of concepts and the interrelationship of places, environments and processes. • Applies understanding to deconstruct information and make logical connections throughout. • A balanced, well-developed argument. Judgements are supported with evidence throughout. • Uses geographical skills to obtain accurate information that supports arguments.
2	3–5	<ul style="list-style-type: none"> • Some understanding of concepts and the interrelationship of places, environments and processes. • Applies understanding to deconstruct information and make some logical connections. • Imbalanced argument with mostly relevant information. Judgements are occasionally supported with evidence. • Uses geographical skills to obtain accurate information that occasionally supports arguments.
1	1–2	<ul style="list-style-type: none"> • Isolated elements of understanding of concepts and the interrelationship of places, environments and processes. • Attempts to apply understanding to deconstruct information but this is flawed. • Unbalanced or incomplete argument with limited understanding. Judgements are supported with limited evidence. • Uses some geographical skills to obtain information with limited relevance and accuracy.
	0	No acceptable response

Example answer: Developed countries such as the US have sophisticated tropical cyclone prediction and warning systems in place. There are over 20 satellites, as well as radar and computer modelling, which help people forecast when and where a cyclone is going to hit. This means that early warning systems can give people plenty of time to prepare and evacuate. The US also runs public awareness campaigns and have pre-planned evacuation routes in places where tropical cyclones are likely. However, evacuation plans aren't always effective as some people can be reluctant to leave their homes.

A developing country like Bangladesh might have less technical prediction systems. Bangladesh buys in satellite technology and gives live radar weather updates via text message. This may be less effective if not everybody owns a mobile phone or has good signal coverage. Like the US, they also run public awareness campaigns and have built concrete cyclone shelters that people can use in an emergency. However, lack of transport can limit the effectiveness of these, and like in the US, some people might refuse to leave their homes to evacuate.

Overall, the effectiveness of tropical cyclone prediction and warning may be slightly higher in developed countries like the US, but developing countries like Bangladesh are quickly improving their coverage and effectiveness.

- 2.
- a) Strong winds and storm surges.
 - b) Farmland would be contaminated if a storm surge floods the fields with salt water. The high rainfall and strong winds will increase the danger from coastal erosion.
 - c) There is little evidence to show that tropical cyclones overall are becoming more frequent. In some areas the numbers are increasing but in other parts of the world they have become less common. There is evidence that the intensity of tropical cyclones has increased in recent years and that is because of climate change. As the earth gets warmer, there is more energy available for the formation of tropical cyclones.
 - d) Sea temperatures explain the distribution and movement of tropical cyclones. The temperatures need to exceed 27°C so they are found over tropical oceans except where there are cold ocean currents. They move in the summer and autumn when the temperatures are highest. Most are found 5-15° north and south of the equator where there is sufficient 'spin' caused by the Earth's rotation. In tropical areas the intense heat makes the air more unstable, causing the air to rise more rapidly associated with the converging Hadley cells. The westerlies and trade winds will determine the direction moved by the tropical cyclones. In the northern hemisphere the trade winds will move them from north-east to south-west whereas westerlies determine their movement from the south-west to the north-east.

e) This question is level-marked:

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2	3–5	<ul style="list-style-type: none"> • Some understanding of concepts and the interrelationship of places, environments and processes. • Applies understanding to deconstruct information and make some logical connections. • Imbalanced argument with mostly relevant information. Judgements are occasionally supported with evidence. • Uses geographical skills to obtain accurate information that occasionally supports arguments.
1	1–2	<ul style="list-style-type: none"> • Isolated elements of understanding of concepts and the interrelationship of places, environments and processes. • Attempts to apply understanding to deconstruct information but this is flawed. • Unbalanced or incomplete argument with limited understanding. Judgements are supported with limited evidence. • Uses some geographical skills to obtain information with limited relevance and accuracy.
	0	No acceptable response

Example answer: *Developed countries like the USA have the necessary finance and technological know-how to be well prepared for the arrival of a tropical cyclone. Their modern forecasting methods using satellites, radar, and computer modelling mean that the countries are well informed when a cyclone is on its way and so can evacuate people before it hits land. There are well-documented plans with evacuation routes and easy access to the emergency services. Artificial reinforcements like levees have been built to protect low-lying areas that would suffer from a storm surge. In the past, less-developed countries were ill-prepared for such an event and so suffered terrible tragedies with great loss of life and structural damage. More recently, less-developed countries which are affected by tropical storms frequently, like Bangladesh, have developed effective preparation plans which have resulted in reducing the disastrous effects of the storms. Bangladesh buys in satellite data and transmits warning by sending texts and by other methods. Coastal embankments are being built to protect the most vulnerable areas. Cyclone shelters built on stilts provide shelter from wind and rain and keep people away from flood waters when there is a storm surge. As a result of these plans, Bangladesh's cyclone deaths have dropped by 100% since the 1970s. There is still much more the country can do, particularly in improving communications to get aid to damaged areas and to get the injured to hospital.*

- 3.
- a)
- i) The area is low lying.
 - ii) The looks like a rich area so the properties and infrastructure will be costly to replace or repair.
- b) This question is level-marked:

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	0	No acceptable response

Example answer: *The social effects of tropical cyclones are those which affect people directly. At worst, people can die or be badly injured due to flooding or from flying debris caused by the heavy rain and strong winds. If the water and sewage infrastructure is damaged, drinking water can become contaminated, which affects people's health. Economically, people will be worse off if they lose their jobs, or if they are unable to produce enough food to sell or feed their families because the fields are flooded following the storm. They may be faced with higher insurance premiums and the cost of repairing or replacing their homes. The government will be faced with the cost of repairing the communication network and infrastructure. If the country affected is poorly developed in the first place, this will make development even more difficult and will keep many people in poverty. This may result in the need to increase taxes to pay for the work. Storm surges will affect areas which are flooded by salt water following*

a storm surge. This would also have an adverse effect on coastal ecosystems, leading to the extinction of unique plant and animal life.

- 4.
- a) If there are several volcanic eruptions, there is an increase in the amount of dust and ash in the atmosphere. These particles stop the heat from the Sun's rays reaching the earth. The sulphur dioxide which is also produced in a volcanic eruption reflects some of the rays back into space. This will result in temperatures falling so the world's climate experiences a 'volcanic winter'.
 - b) The ITCZ zone is found at low latitudes either side of the equator. The Sun remains high in the sky throughout the year so there is direct solar insolation. The high angle of the Sun means that the energy from the Sun is concentrated and not dispersed over a larger area, which would happen if the angle of the Sun was much lower. Insolation has a more direct path through the atmosphere. This means there is less heat loss. This ensures intense heating of the earth and so the air temperatures remain high.