

# CAIE Geography Pre-U

## 3A - Meteorological Hazards

### Flashcards



What are the methods of classifying meteorological hazards?



What are the methods of classifying meteorological hazards?

By scale and frequency, by nature of the hazard, by the scale of intensity for wind hazards or by wind speed for wind hazards.



# Where do cyclones occur?



# Where do cyclones occur?

Mainly occur in the tropics, occur near the coast and are mainly on the east side.



What are the four ways of vertical heat transfers?



What are the four ways of vertical heat transfers?

Conduction, convection, radiation and latent heat.



# How is heat transferred horizontally?





# How is heat transferred horizontally?

Tri-cellular model, ocean currents and jet streams.



Which cell are cyclones most likely to occur in?



Which cell are cyclones most likely to occur in?

The Hadley cell.



# What is the Coriolis force?



## What is the Coriolis force?

The apparent deflection of objects that are moving in a straight path relative to the Earth's surface and is due to the rotation of the Earth.



# What are the characteristics of tropical cyclones?



What are the characteristics of tropical cyclones?

Low atmospheric pressures, high winds and heavy rain.



# What is the structure of a tropical cyclone?





# What is the structure of the tropical cyclone?

In the central part is the eye which is surrounded by the eye wall. Rainbands spiral into the centre of the storm.



What are the conditions that must be present for a tropical cyclone to occur?



What are the conditions that must be present for a tropical cyclone to occur?

Over  $26.5^{\circ}\text{C}$  ocean temperatures, rapid cooling of the atmosphere with height, enough moisture, at least 500 km from the equator and low levels of the rate of change of wind speed with an increase in altitude.



# What is the Bernoulli Principle?



## What is the Bernoulli Principle?

States that as there is an increase in the difference between pressures of two areas the movement of air increases.



# How are tropical cyclones changing?



# How are tropical cyclones changing?

Getting stronger, lasting longer, moving more slowly along the ground and forming faster.



How much will the frequency of CAT 4  
and CAT 5 hurricanes increase by?





How much will the frequency of CAT 4 and CAT 5 hurricanes increase by?

45-87%



How much did the land affected by droughts increase by between 1950 and 2000?



How much did the land affected by drought increase by between 1950 and 2000?

From 1% to 3%



In 2012 how much of the USA  
experienced abnormally dry conditions  
and how much did it cost?



In 2012 how much of the USA experienced abnormally dry conditions and how much did it cost?

81% and it cost \$30 billion.



# Why are droughts increasing?



## Why are droughts increasing?

Global surface temperatures are rising due to climate change which means there are increased evapotranspiration so there is less surface water.



Why is the frequency of flooding increasing?





# Why is the frequency of flooding increasing?

Deforestation so levels of infiltration are decreasing, rising sea levels, urbanisation and building on land which is prone to flooding.



How much has flooding in European rivers increased by since 1995?



How much has flooding in European rivers increased by since 1995?

44%



How much is Eastern USA seeing an increase in extreme rainfall events?



How much is Eastern USA seeing an increase in extreme rainfall events?

50%



# What are tornadoes?



What are tornadoes?

Vertical funnels of rapidly spinning air.



# How are tornadoes formed?





## How are tornadoes formed?

Change in wind direction or speed creates a horizontal spinning effect within a storm cell which is then tipped vertical by strong updrafts.



How many deaths and injuries are there each year in Tornado Alley as a result of tornadoes?



How many deaths and injuries are there each year in Tornado Alley as a result of tornadoes?

80 deaths and 1,500 injuries.



# What are supercells?



# What are supercells?

Storms that contain updrafts that rotate about a vertical axis.



# How are storm cells created?



# How are storm cells created?

When a moisture-rich, warm air mass collides with a cooler, drier air mass.



# How is hail formed?





## How is hail formed?

A droplet of water freezes, falls and then is pushed back up due to strong updrafts. Another water droplet will then freeze onto it. This repeats until it is too heavy and it will fall as hail.



How many people died in India in 1888  
due to a hailstorm?



How many people died in India in 1888 due to a hailstorm?

250



# What is a blizzard?



# What is a blizzard?

When there are large amounts of snowfall, winds greater than 56 km/hr, less than a quarter of a mile visibility and it lasts for three hours.



# How do blizzards form?



## How do blizzards form?

When cold air meets with warm, moist air. The cold air is at ground level and the moisture-rich, warm air is rising above it.



# What is fog?





# What is fog?

A thick cloud of tiny water droplets suspended near or at the Earth's surface.



What are the two types of fog?



What are the two types of fog?

Advection or infrared cooling.



# How is fog formed by advection?



## How is fog formed by advection?

Warm air is pushed by wind along a cool surface. The moisture in the warm air condenses to form fog.



# How is fog formed by infrared cooling?



## How is fog formed by infrared cooling?

In the summer the ground absorbs solar radiation, when it cools, a cooler air mass collides with the warm moist air mass prevalent over the warm ground. This causes the water vapour to condense to form fog.



# How is photochemical fog formed?





# How is photochemical fog formed?

When ultraviolet light from the sun reacts with nitrogen oxides in the atmosphere.



What are the primary hazards of met hazards?



## What are the primary hazards of met hazards?

Storm surge, strong winds, collapse of building, death and injury, floodings, roads blocked, hospitals/schools damaged, hypothermia, transport disrupted, increase in road accidents, roof collapse, reduced visibility respiratory problems and crops damaged.



What are the secondary hazards of met hazards?



## What are the secondary hazards of met hazards?

Increase in spread of diseases, landslides, increase in food prices, famine, increase in water-borne diseases, communications damaged, transport and trade disrupted, pollution, no school, decrease in productivity and a strain on the health service.



# What are the economic consequences for HICs?



What are the economic consequences for HICs?

Job losses, businesses collapse, lower productivity and cost to the insurance companies.



What are the economic consequences  
for LICs?





What are the economic consequences for LICs?

Reliance on aid and aid could undercut local prices and put local businesses out of business.



# What are the social consequences for HICs?



What are the social consequences for HICs?

Unable to go to work, homelessness and death and injury.



# What are the social consequences for LICs?



What are the social consequences for LICs?

Death and injury, spread of diseases and displacement or migration.



# What are the environmental consequences?



What are the environmental consequences?

Damage to habitats, air pollution, water pollution, debris, and agriculture affected.



# What are the political consequences for HICs?





What are the political consequences for HICs?

Criticism of government, prioritisation needed and media influence.



What are the political influences for  
LICs?



What are the political consequences for LICs?

Corruption from aid and instability.



# What is mitigation?



# What is mitigation?

Attempting to stop the effects of the hazard by trying to plan beforehand.



# What is adaptation?



# What is adaptation?

Attempting to live with the hazard by altering lifestyles.



# What does modifying the risk involve?





What does modifying the risk involve?

Monitoring, prediction, prevention.

Forecasting and warning, land-use planning, and reducing global warming.



What does modifying the hazard  
involve?



What does modifying the hazard involve?

Preparation, protection and reduction of impacts.

Community preparedness, environmental control and design.



# What does modifying the loss involve?



What does modifying the loss involve?

Rescue, relief and recovery.

Accept loss, aid, insurance and emergency services and disaster relief teams.



# What was the cause of the Moore tornado?



What was the cause of the Moore tornado?

Two days of storms turned into several supercell thunderstorms. One of these which contained strong updrafts soon turned into a tornado.



What were the consequences of the Moore tornado?





What were the consequences of the Moore tornado?

24 people killed, 120 people needed treatment in hospital, 300 homes destroyed and \$2 billion worth of damage.



# What was the management of the Moore tornado?



# What was the management of the Moore tornado?

Food, hygiene kits, blankets, cleaning supplies, tarpaulins, school materials, clothes and household supplies were given. Materials and help was provided to rebuild homes.



What was the preparation for the Moore tornado?



# What was the preparation for the Moore tornado?

Planned responses and drills at school, businesses and emergency departments. People told to secure outdoor units. Underground shelters or safe places known by residents.



# What were the causes of the Beast from the East?



## What were the causes of the Beast from the East?

Stratospheric warming disrupted the jet stream, heating over north pole weakened the jet stream and allowed cold air mass from Russia to move in. Met with Storm Emma.



What were the primary impacts of the  
Beast from the East?





What were the primary impacts of the Beast from the East?

10 people died, 50cm of snow fell and  
-12°C lows.



What were the secondary impacts of the  
Beast from the East?



What were the secondary impacts from the Beast from the East?

Hundreds of schools were forced to close, hospital operations were cancelled, rail and air services cancelled and a shortage of food.



# What was the response to the Beast from the East?



What was the response to the Beast from the East?

Red weather warning issued and advice given. Royal air force and military helped with relief efforts.



How many hectares of crops were damaged in India in 2018 due to a hailstorm?



How many hectares of crops were damaged in India in 2018 due to a hailstorm?

0.476 million



How many people die each year as a result of air pollution?





How many people die each year as a result of air pollution?

18,000



What is the management and mitigation  
for photochemical smog and air  
pollution?



What is the management and mitigation for photochemical smog and air pollution?

Switching to renewable energy and developing high-quality transport systems.



What is the GDP per capita in Haiti compared with Florida?



What is the GDP per capita in Haiti compared with Florida?

\$730 compared with \$39,500



How much greater is the life expectancy  
in Florida compared with Haiti?



How much greater is the life expectancy in Florida compared with Haiti?

15 years.



How much greater is the literacy rate in Florida compared with Haiti?





How much greater is the literacy rate in Florida compared with Haiti?

31%



What was the damage to infrastructure in Haiti from Hurricane Matthew?



What was the damage to infrastructure in Haiti from Hurricane Matthew?

80% of buildings in Jeremie destroyed  
and 30,000 homes destroyed in the Sud  
Province.



# What was the damage to infrastructure in Florida?



What was the damage to infrastructure in Florida?

282,000 people affected by power outages and \$7.5 billion in insured losses.



# What were the social impacts in Haiti?



What were the social impacts in Haiti?

1,000 people killed and 175,000 were made homeless.



How many people were killed in Florida?





# How many people were killed in Florida?

33



What were the secondary effects of  
Hurricane Matthew in Haiti?



What were the secondary effects of Hurricane Matthew in Haiti?

Food crisis due to crops being destroyed, price of rice rose, water-borne diseases were prevalent and cholera killed 29 people.



# What were the responses to Hurricane Matthew in Haiti?



## What were the responses to Hurricane Matthew in Haiti?

Hygiene and water treatment kits, food supplies and tarpaulins given out. Cash-for-work programmes, establishing early warning systems and preparing Haitians for a recurrence of another hurricane.



# What were the responses to Hurricane Matthew in Florida?



What were the responses to Hurricane Matthew in Florida?

70 boat crews performed 2,000 rescues, and helicopters did 94 rescue missions from rooftops. \$7.5 billion worth of insurance given out.

