

# CAIE Geography Pre-U

## 1B - The Atmospheric Environment

### Flashcards



# What is climate classification?



## What is climate classification?

The formalisation of systems that recognise, clarify and simplify climatic similarities and differences between geographical areas.



Where is the equatorial climate located?



Where is the equatorial climate located?

10° north/south of the equator.



What climate does the equatorial region experience?



What climate does the equatorial region experience?

Between  $26^{\circ}\text{C}$  and  $28^{\circ}\text{C}$  and 2000mm of rainfall and year.



# How is the equatorial climate formed?





## How is the equatorial climate formed?

Sun's rays hit equatorial climate directly, high temperatures lead to high levels of evaporation so high humidity and cloud cover. Also influenced by ITCZ.



Where the the semi-arid tropical climate  
located?



Where is the semi-arid tropical climate located?

Between  $5^{\circ}$  and  $10^{\circ}$  north/south of the equator.



What climate does the semi-arid tropical region experience?



What climate does the semi-arid tropical region experience?

Between 20°C and 30°C with a wet and dry season. 80% of its total annual rainfall falls in 4 months.



# How is the semi-arid tropical climate formed?



How is the semi-arid tropical climate formed?

Sun appears to move overhead and so brings heat and the ITCZ which causes the wet and dry seasons.



# Where are arid tropical climates located?





Where are arid tropical climates located?

Between  $15^{\circ}$  and  $30^{\circ}$  north/south of the equator and are most extreme on the western sides of the continent.



What climate does the arid tropical region experience?



What climate does the arid tropical region experience?

Temperatures between  $30^{\circ}\text{C}$  and  $35^{\circ}\text{C}$  with diurnal ranges of up to  $50^{\circ}\text{C}$ . Less than 250mm of rainfall annually.



# How is the arid tropical climate formed?



# How is the arid tropical climate formed?

Occur in areas of subsiding air which causes high pressure and sinking, stable air.



Where are semi-arid temperate/warm temperate west coast climates located?



Where are semi-arid temperate/warm temperate west coast climates located?

Between  $30^{\circ}$  and  $40^{\circ}$  north/south of the equator on the west side of the continents.



What climate does semi-arid  
temperate/warm temperate west coast  
regions experience?





What climate does semi-arid temperate/warm temperate west coast regions experience?

Temperatures between  $12^{\circ}\text{C}$  and  $25^{\circ}\text{C}$  with hot summers and warm winters.  
Annual precipitation around 500mm.



How are semi-arid temperate/warm temperate west coast climates formed?



How are semi-arid temperate/warm temperate west coast climates formed?

Trade winds bring arid conditions. Sun's rays are intense and there is little cloud cover. ITCZ brings moisture in winter.



Where is the semi-arid temperate/cool temperate continental climate found?



Where is the semi-arid temperate/cool temperate continental climate found?

Places like North America, Russia and Austria.



What climate does the semi-arid temperate/cool temperate continental region experience?



What climate does the semi-arid temperate/cool temperate continental region experience?

Around  $20^{\circ}\text{C}$  on average and experience 500mm of rain on average.



How is the semi-arid temperate/cool temperate continental climate formed?





How is the semi-arid temperate/cool temperate continental climate formed?

Land warms up rapidly during the summer months but cools quickly during the winter. Little moisture due to it being continental.



Where is the humid temperate/warm temperate east coast climate located?



Where is the humid temperate/warm temperate east coast climate located?

Between the arctic circle and the tropic of Cancer which mainly encompasses eastern Asia.



What climate does humid temperate/warm temperate east coast region experience?



What climate does humid temperate/warm temperate east coast region experience?

Between  $20^{\circ}\text{C}$  and  $30^{\circ}\text{C}$  with monsoon seasons and around 600 mm of annual rainfall.



Where is humid temperate/cool  
temperate west coast climate located?



Where is humid temperate/cool temperate west coast climate located?

Between  $45^{\circ}$  and  $60^{\circ}$  north/south of the equator.



What climate does the humid temperate/cool temperate west coast region experience?





What climate does the humid temperate/cool temperate west coast region experience?

Temperatures between 8 and 20°C with annual precipitation of around 2000 mm.



How is the humid temperate/cool temperate west coast climate formed?



How is the humid temperate/cool temperate west coast climate formed?

Low angle of the sun in the sky,  
moderating influence of the sea, and the  
convergence of air masses.



Where is the boreal climate located?



Where is the boreal climate located?

At 60° north.



# What climate does the boreal region experience?



What climate does the boreal region experience?

-25°C to 25°C temperatures and around 300 mm of annual rainfall. Large seasonal variations.



# How is the boreal climate formed?





## How is the boreal climate formed?

Little moderating influence from the sea, strong wind chill factors, and air can hold little moisture as it is cold.



Where is the arctic climate located?



Where is the arctic climate located?

65° north/south.



What climate does the arctic region experience?



What climate does the arctic region experience?

-30°C to 10°C. Precipitation around 110 mm annually



# How is the arctic climate formed?



# How is the arctic climate formed?

Low angle of the sun in the sky, high wind chill factors, ground doesn't heat up due to large amounts of reflection.



# What is an open system?





What is an open system?

Where energy and matter flows in and out.



# What is a closed system?



What is a closed system?

Where only energy flows in and out of a system.



# What is positive feedback?



# What is positive feedback?

Where the primary effect of a loop starts a process which in turn increases the primary effect.



# What is negative feedback?



# What is negative feedback?

Where the primary effect starts a process which then decreases the primary effect and the loop breaks down.



# What is the troposphere?





# What is the troposphere?

The lowest atmospheric layer which contains our weather and decrease in temperature as altitude increases.



# What is the stratosphere?



# What is the stratosphere?

Extends up from the troposphere, increases in temperature and contains the ozone layer.



# What is the mesosphere?



# What is the mesosphere?

Extends up from the stratosphere and decreases in temperature.



# What is the thermosphere?



# What is the thermosphere?

The last atmospheric layer, the hottest layer and increases in temperature.



What are the four factors that affect the level of insolation that enters our atmosphere?





What are the four factors that affect the level of insolation that enters our atmosphere?

- Solar constant
- Eccentric orbit of the earth leads to different distances from the sun
- Altitude of the sun in the sky
- Length of the night and day



What are the three vertical heat transfers?



What are the three vertical heat transfers?

Absorption, scattering and reflection.



What are the four outputs of long-wave radiation?



What are the four outputs of long-wave radiation?

Radiation, conduction, convection and latent heat.



# What is latent heat?



# What is latent heat?

The amount of heat energy required to change the temperature of a substance.



# What is albedo?





# What is albedo?

The ratio between incoming radiation and the amount reflected, expressed as a percentage.



# Why is there a need for horizontal energy transfers?



Why is there a need for horizontal energy transfers?

As the equator receives more energy than the poles, the energy needs to be transferred to stop the equator from overheating and the poles from continuing to cool.



What percentage of horizontal energy transfers are oceanic energy transfers responsible for?



What percentage of horizontal energy transfers are oceanic energy transfers responsible for?

20%



What percentage of horizontal energy transfers are atmospheric energy transfers responsible for?



What percentage of horizontal energy transfers are atmospheric energy transfers responsible for?

80%



What are the three cells of the tri-cellular model?





What are the three cells of the tri-cellular model?

Hadley, Ferrel and Polar



# What is the ITCZ?



# What is the ITCZ

The Inter-tropical convergence zone is the meeting of trade winds in the equatorial region.



What are the 5 determinants of climate?



What are the 5 determinants of climate?

Latitude, proximity to oceans, altitude, position relative to the tri-cellular model and aspect.



# What are jet streams?



# What are jet streams?

Narrow zones of high-speed winds that are found high up in the atmosphere.



Where is the cool temperate western maritime climate located?





Where is the cool temperate western maritime climate located?

Between  $40^\circ$  and  $60^\circ$  within the Ferrel cell and on the boundary with the Polar cell. They are close to the oceans and along the west coast.



# What are air masses?



# What are air masses?

Parcels of air which have the same temperature, humidity and lapse rate.



# What is the polar front?



What is the polar front?

The transition boundary between tropical maritime air and polar maritime air.



# What is a warm front?



What is a warm front?

Where warm air is advancing and being forced to override cold air.



# What is a cold front?





What is a cold front?

Where advancing cold air undercuts the body of warm air.



# What is an occluded front?



What is an occluded front?

Where a cold front catches up with a warm front.



# What are depressions?



# What are depressions?

Areas of low pressure, also known as cyclones.



What are the three stages to a depression?



What are the three stages to a depression?

Embryonic, mature and decaying.



What weather occurs during a depression in summer?





What weather occurs during a depression in summer?

Prolonged rainfall and flooding also nice weather can occur in between weather fronts.



What weather occurs during a depression in winter?



What weather occurs during a depression during winter?

Heavy rainfall, heavy snowfall and stormy conditions.



# What are anticyclones?



# What are anticyclones?

Areas of high pressure formed by falling air.



What weather occurs during an anticyclone in summer?



What weather occurs during an anticyclone in summer?

Warm, dry weather with droughts and heatwaves experienced.



What weather occurs during an anticyclone in winter?





What weather occurs during an anticyclone in winter?

Cold, dry, frosty days.



# What are blocking anticyclones?



## What are blocking anticyclones?

Areas of high pressure which remain stationary for long periods of time and distorts the usual eastward progression of pressure systems.



# What is the monsoon?



What is the monsoon?

Seasonal reversal in winds and the subsequent change in precipitation.



# What are the causes of the monsoon?



What are the causes of the monsoon?

Rapid heating of land compared with the ocean, movement of the ITCZ and the impact from the Himalayas.



What are the impacts of the summer monsoon?





What are the impacts of the summer monsoon?

Extreme flooding, damage to crops, lots of water for irrigation, infrastructure and tourism damaged and compromise of water purification facilities.



# What are the impacts of the winter monsoon?



What are the impacts of the winter monsoon?

Allows rice to ripen, be planted and harvested, low amounts of water are available for irrigation and drought.



# How is the monsoon being managed?



# How is the monsoon being managed?

Holias, drought and flood resistant crops, forecasting and early warning systems, water distribution systems and seed banks.



# What is ENSO?



## What is ENSO?

The El Niño Southern Oscillation is irregular periods of changing wind speeds and the resulting change in ocean currents in the Pacific Ocean.



# What happens during an El Nino year?





What happens during an El Nino year?

Trade winds are weaker due to less atmospheric pressure differences so less upwelling of cold water up the coast of Peru.



# What happens during a La Nina year?



What happens during a La Nina year?

Atmospheric pressure differences are greater and so the trade winds are strong. Strong upwelling of cold water by Peru.



# How can ENSO be managed?



## How can ENSO be managed?

Monitored through ocean buoys, satellites. Drought/flood resistant crops, seeds stored, advice given to citizens and preparation of emergency services.



What are the natural causes of global warming?



What are the natural causes of global warming?

Astronomical forcing, amount of energy emitted by the sun, volcanic eruptions and natural greenhouse gases.



What are the human causes of global warming?





What are the human causes of global warming?

Industrialisation, deforestation, commercialised agriculture and increased levels of CO<sub>2</sub> and pollution due to urbanisation.



What are the negative impacts of global warming?



# What are the negative impacts of global warming?

More storms in Britain, Pacific islands submerged, coastal areas flooded, increased coral bleaching, increase in famine and malnutrition, disease vectors becoming more distributed and cereal production in low latitudes will decrease.



What are the positive impacts of global warming?



What are the positive impacts of global warming?

Cereal production in high latitudes will increase and some food items will be able to be grown in higher latitudes.



What are the mitigation strategies to manage global warming?



What are the mitigation strategies to manage global warming?

Using renewable energy, capturing CO<sub>2</sub> emissions and setting targets to reduce CO<sub>2</sub> emissions.



What are the adaptation strategies to manage global warming?





What are the adaptation strategies to manage global warming?

Planting drought resistant crops,  
managing coastline retreat and investing  
in better freshwater provisions.



Name three classification systems.



Name three classification systems.

John E. Oliver, Thornthwaite, Koppen.



# What is genetic classification?



# What is genetic classification?

## Classifying climate based on their causes.



# What is empirical classification?



# What is empirical classification?

Classifying climate based on their effects on the area.



# How did John E. Oliver classify climates?





How did John E. Oliver classify climates?

Genetically, by designating particular air masses and combinations.



# How did Thornthwaite classify climate?



How did Thornthwaite classify climate?

Empirical classification where he compares potential evaporation with actual evapotranspiration.



# How did Koppen classify climate?



# How did Koppen classify climate

Empirical classification based on temperature and precipitation.



# What were the causes of the Great Storm?



## What were the causes of the Great Storm

Extreme heating over the bay of Biscay, collision of warm tropical air and cold polar air, and was boosted by a phenomenon known as string jet.



# What were the impacts of the Great Storm?





# What were the impacts of the Great Storm?

- 15 million trees blown down
- Public transport halted
- 18 people died
- £2 billion cost to insurance companies
- Several hundred people left without power



# What were the causes of the European heatwave?



What were the causes of the European heatwave?

High pressure over most of Western Europe and anticyclone anchored over northern France.



# What were the impacts of the European heatwave?



What were the impacts of the European heatwave?

Portugal lost 10% of their forests due to fires, wheat harvest in UK down 12%, 35,000 people died and public transport halted.



What were the responses of the government to the heatwave?



What were the responses of the government to the heatwave?

Hosepipe ban, advice given by media, speed restrictions for trains and workers hours altered.

*However, French government heavily criticised for doing too little too late.*

