geography T3 Timed Practice Notes: Climate Topic 1

1.1

-Weather is the state of the atmosphere at a particular place and time.

Variables: Air temperature, cloud cover, precipitation, wind speed and wind direction.

- Climate is the **average** state of the atmosphere at a particular place over **a long period** of time (25y≥)

↳ Tropical Equatorial, Tropical monsoon, cool temperate climates.

generally high temps	generally high temps	4 distinct seasons
small annual temp range	small annual temp range	large annual temp range
high annual precipitation	high annual precipitation	low annual precipitation
evenly spread	unevenly distributed	evenly distributed

-Climatic hazards like extreme weather events are expected to occur more often. This can impact natural and human system significantly.

1.2

☆ Air temperature

1. varies in a day.

↳ due to earths rotation on its own axis. (24h)

↳ at midday, sun is directly overhead. Otherwise, it is not directly overhead.

concentrated solar radiation. less concentrated solar radiation.

2. varies in a year.

↳ due to Earth's revolution around the sun. (365d)

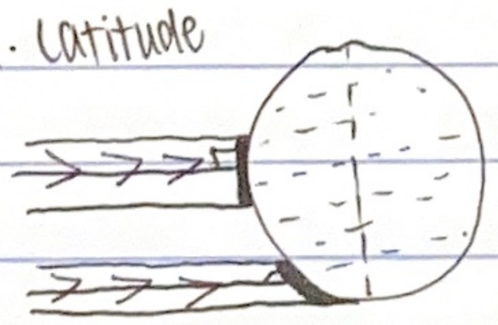
Different hemispheres experience different amounts of solar radiation.

June: NH high temp, SH low temp. Dec: NH low temp, SH high temp.

March + Sept: Equal solar radiation!

☆ varies across places due to diff in:

1. Latitude



more direct rays → more concentrated, higher temps

vs (similar to pressure)

less direct rays → less concentrated, lower temps

∴ higher the latitude, lower the temps (smaller solar angle)

2. Altitude

Higher altitude, lower air density (less particles), ↓ ability to absorb & radiate heat.

- lower temps.

Lower altitude, higher air density (more particles), ↑ ability to absorb & radiate heat.

- higher temps.

every 1000m increase, there is a 6.5°C decrease. ∴ ↓ 6.5°C / 1000m.

★ Factors affecting air temperature at specific sites

1. Type of surface

- Dark surfaces absorb more solar radiation and radiate more heat
  - ↳ urban areas radiate more heat due to black surfaces
- light & shiny surfaces absorb less solar radiation and radiate less heat.
  - ↳ glass skyscrapers reflect sunlight to ground

2. Distance from sea ★ (important)

Coastal areas	vs	inland areas
- due to maritime effect:		due to continental effect:
colder summers		warmer summers
warmer winters		colder winters
(↓ temp range)		(↑ temp range)

This is because sea (water) heats up much slower than land.
(and cools)

1.3

Water cycle (ref to tb diagram)

- water moves on & below Earth's surface at different rates.

1. Type of soil: flows & infiltration is faster in soil with larger pores vs smaller pores.
(sandy soil vs clayey soil)

2. Built up: Infiltration rates are lower when surfaces are covered with concrete.
speed of run-off is increased due to smoother ground.

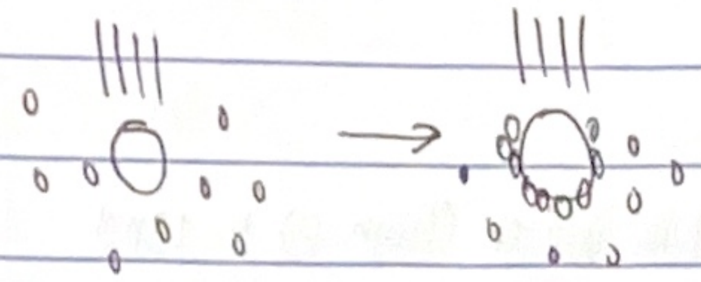
3. Vegetation (natural): rates are faster when roots of vegetation loosen soil, creating more open spaces in soil for water to pass. However in artificial vegetated areas roots act as barriers due to overpopulation in one area.

Relative Humidity

$$RH = \frac{\text{actual amount of water vapor present}}{\text{max amount of water vapor air can hold}} \times 100\%.$$

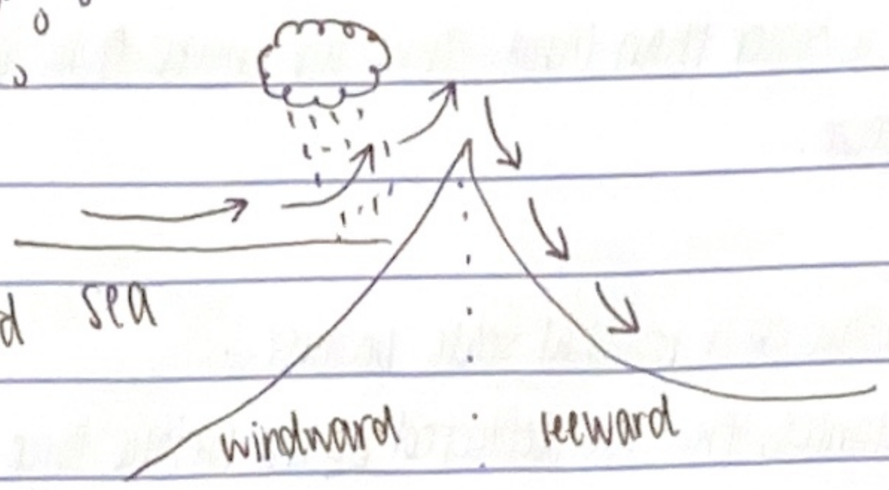
when RH exceeds 100%., condensation occurs.

when condensing after RH > 100%., the water vapour in air condenses onto condensation nuclei found in air. It can be in the form of dust, ash etc. It provides solid surfaces for water vapour to change & condense into water droplets.



shows water droplets in clouds collide and coalescence, becoming bigger and heavier.

☆ relief rain (important)



1- winds pick up moisture from the sea, pushing moist air up windward side of mountain.

- rising moist air cools and condenses on condensation nuclei, where they collide & coalescence and fall to the ground as rain, still on the windward side.

- dry air over at the leeward side, making the environment hot and dry.

1-4

Winds occur due to the unequal distribution of air temperature, creating uneven distributions of pressure gradients.

In high temperatures,	In low temperatures,
air is heated and rises (less dense). resulting in lower atmospheric pressure.	air is cooled and sinks (becomes denser). resulting in higher atmospheric pressure.

air moves from place with higher pressure to place with lower pressure, forming wind.
(cold → hot)

Wind speed depends on:

1. strength of pressure gradient
   - ↳ smaller diff in pressure between 2 areas leads to slower wind speeds
   - ↳ larger diff in pressure between 2 areas leads to faster wind speeds
2. Friction
   - ↳ moving air comes into contact with variations in Earth's topography, experiencing frictional drag

Local Winds:

1. Land breezes

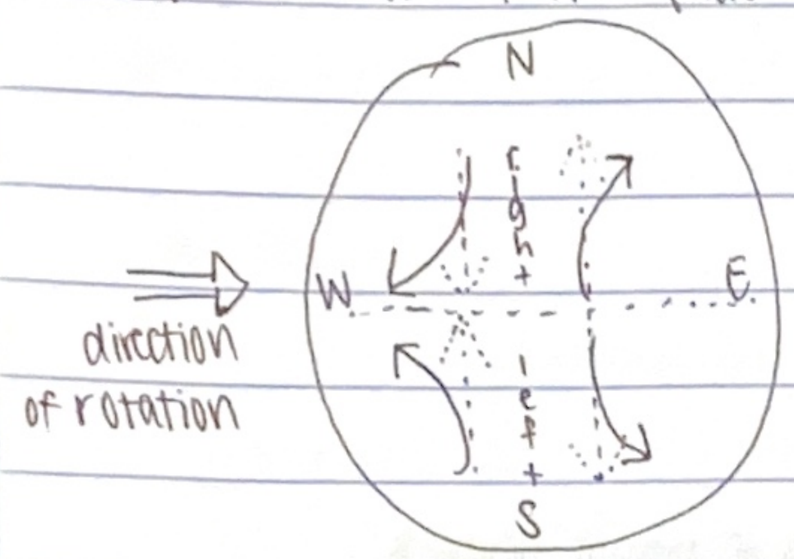
At night, land is cooler than water as water takes very long to change temperature. Thus air moves from land (high P) to water (low P), forming land breeze

2. Sea breeze

Conversely, in the day, water is cooler than land. Thus air moves from water (high P) to land (low P), forming the sea breeze.

Winds vary across Earth's surface on a regional scale because...

- as they travel over large distances, they are deflected by the coriolis force.
- ☆ - in Northern Hemisphere: Winds deflect/curve to their Right. (Northeast Monsoon)
- ☆ - in Southern Hemisphere: Winds deflect/curve to their Left. (Southwest Monsoon)



look from the direction where the arrow faces ↑.

∴ when coming down from central Asia to Australia, arrows are facing ↓ so it appears inverted.

Questions

Essay: Only convectional rain affects the temp of an area. To what extent do you agree with this statement? (1·3)

Technique: DEE ×2 + conclusion

D(1): Convectional rain affects the temp of an area greatly. Convectional rain is when warm air rises and cools to form clouds, and is then fallen to the ground as convectional rain.

E(1): When the heat from the sun is absorbed by the land, it heats the air above it. This causes the air to increase in density and rise up. As it rises up, it cools, condensing on condensation nuclei at dew point temperature, forming clouds that soon fall to the ground, cooling the area.

E(1): one example would be the frequent afternoon thunderstorms in Singapore, as the air was heated and cooled at noon, and has become large and heavy enough to fall as convectional rain over Singapore.

D(2): Relief rain affects the temp of an area greatly. This occurs when moist air from the sea travels up a mountain, cools and falls as relief rain.

E(2) When winds pick up moisture over the sea, it pushes the moist air up the windward side of the mountain. It then cools and condenses on condensation nuclei at dewpoint temp, forming clouds. They collide and coalesce, falling as relief rain when they become large and heavy enough. Leeward side of mountain experiences dry, descending air.

E(2): For example, the windward side of Sierra Nevada mountain ranges in the USA recieves higher rainfall due to relief rain, having lush, green forests. However, its leeward side is hot and dry due to the dry descending air, creating the Death Valley desert.

Conclusion: While both affect the temperature of an area greatly, relief rain affects the temperature of an area more. This is because as compared to convectional rain, where there is no guarantee of high moisture in the heated air, there is a constant moisture supply from the sea that is next to the mountains, having more moisture in the air to form clouds, which will then cause more frequent precipitation, cooling the area even more than that of relief rain. Thus, relief rain affects the temperature of an area more greatly.

☆ Climograph:

1. Temp range. Small (less than 5°C), moderate (5°C - 9°C), large (10°C ≥)
2. Annual mean temp. Low (>15°C), Moderate (16°C - 24°C), high (25°C ≥)
3. Total annual rainfall. Low (>1000 mm), High (1000 mm >)
4. Rainfall distribution. Unevenly/evenly distributed (state months clearly.)