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Chapter 1 : Grade 12 Geography 3 in 1 CAPS | The Answer Series

**CLIMATOLOGY NOTES* In this topic we focus on the following descriptions. 1. Global air circulation 2. Weather patterns 3. Cyclones 4. Microclimate (cities and valleys).*

Updated 22 Feb for the new syllabus 1. Differentiate between weather and climate. Weather is the condition of the atmosphere at a particular place and time whereas climate is the average condition of the atmosphere of a specific place over a long period of time, usually over 30 years. Mean daily temperature â€" sum of hourly temperatures divided by 24 hours Diurnal temperature range â€"maximum temperature minus minimum temperature Mean monthly temperature â€" sum of mean daily temperatures in the month divided by number of days in the month Mean annual temperature â€" sum of mean monthly temperatures in the year divided by 1 Annual temperature range â€" maximum temperature minus minimum temperature recorded in a year Daily rainfall - the amount of rain that falls over 24 hours Monthly rainfall - total amount of rainwater collected throughout the month Annual rainfall - total amount of rainwater collected throughout the year. Explain the daily and seasonal variations in temperature at a particular location. The temperature rises and falls as the Earth rotates from west to east. The location facing the sun experience day and the location which is away from the sun experience night. Temperature rises during the day and falls at night. Places along the equator have equal lengths of day and night all the year. Beyond the equator, places have longer days and hence higher temperatures in summer, and shorter days and lower temperatures in winter. From June to August because of the position of the overhead sun, there is a higher intensity of the sun rays in the northern hemisphere. Thus the temperatures are higher during this period. Compare and explain the variations in temperature between different locations. Places in low latitudes have higher temperatures because they receive vertical sunrays and hence more concentrated insolation. Temperatures are higher as the vertical sunrays travel through shorter distance of the atmosphere and smaller amount of insolation is lost through reflection and scattering. Thus, the higher the altitude, the cooler the air temperature. With increasing altitude or elevation, air becomes less dense and contains less dust and water vapour. In general, air temperature decreases with increasing altitude at a rate of about 0. This change of temperature gradient is called the normal lapse rate or vertical lapse rate. Maritime effect - onshore winds blowing from the sea or ocean to coastal regions tend to lower summer temperatures and raise winter temperatures. Such moderating influence is called maritime influence and is confined to coastal areas. The annual range of temperature in coastal regions is therefore smaller than that in inland regions. This is particularly felt in temperate regions. Continental effect - Inland regions situated at a great distance from the sea have hotter summers and colder winters than coastal regions. On the other hand, night temperatures in these regions do not fall too much. The diurnal range and annual range of temperature are therefore small. Singapore and other equatorial regions. Absence of cloud cover leads to great diurnal range of temperature. The cloud cover in deserts tends to allow maximum solar heating of the land in the daytime. At night there is little cloud cover in desert regions. This produces a great diurnal temperature range in desert regions. Explain the differences in relative humidity in different locations. The amount of water vapour in the air affects relative humidity. Relative humidity also varies with temperature. Warm air can hold more water vapour than cool air. When temperature increases, the amount of water vapour in the air stays the same, but the rise in temperature makes air more able to hold water vapour. Thus relative humidity decreases as temperature increases. Explain the formation of convectional rain and relief rain. Air rises in a convection current after a prolonged period of intense heating. In ascending, its water vapour condenses into cumulonimbus clouds with a great vertical extent. This probably reaches its maximum in the afternoon when the convectional system is well developed. Hot, rising air has a great capacity for holding moisture, which is abundant in regions of high relative humidity. As the air rises, it cools and when saturation point is reached, torrential downpours occur, often accompanied by thunder and lightning. Relief orographic rain is formed whenever moist air is forced to ascend a mountain barrier. It is best developed on the windward slopes of mountains where the prevailing moisture laden winds come from the sea. The air is compelled to rise and is thereby cooled by expansion in the higher altitudes and the subsequent decrease in atmospheric pressure.

Further ascent cools the air until the air is completely saturated. Condensation takes place forming clouds and eventually rain. On descending the leeward slope, a decrease in altitudes increases both the pressure and the temperature; the air is compressed and warmed. Consequently, the relative humidity will drop. There is high evaporation and little or no precipitation. Explain how coastal temperatures are moderated by land and sea breezes. In coastal regions, the land is heated up faster than the sea during the day and the hot air rises resulting in lower pressure over the land than the sea. The air pressure over the sea is higher and thus the air moves towards the land as sea breeze. At night, the land cools faster and thus the air pressure over the land is higher than the sea. The air moves towards the sea as land breeze. Sea breezes usually blow at about mid-afternoon when the temperature difference between the land and the sea is the greatest. This lowers the relatively warmer temperature of the land. Land breezes, on the other hand, cool the warm air over the sea at night. Thus land and sea breezes help to regulate the temperatures of the land and the sea, keeping it at a moderately constant level. Explain the formation of monsoon winds. Monsoon winds are regional wind patterns that reverse direction seasonally due to the Coriolis effect produced by the rotation of the earth. The Coriolis effect cause the wind to be deflected. In the northern hemisphere, the wind is deflected to the right and to the left in the southern hemisphere. Between June and September, the northern hemisphere experience summer and the air over Central Asia heats up, expands and rises, forming a region of low pressure over the area. The southern hemisphere experience winter and the low temperature causes the air to be cold and dense, resulting an area of high pressure over Australia. The Coriolis effects deflect the wind to the right in the northern hemisphere as the northeast monsoon. Describe and explain the distribution and characteristics of equatorial, monsoon and cool temperate climates. Singapore, Johor in Malaysia Characteristics: Due to the high temperatures, water evaporates quickly into the air, forming clouds and convectional rain. Total annual rainfall is high at more than mm throughout with no dry month. Tropical Monsoon climate Location: The rainfall is mainly affected by the monsoon winds which cause a distinct wet and dry season. The onshore monsoon brings the rainy season while the offshore monsoon causes the dry season. In India the offshore NE monsoon does not bring rain except areas close to the Bay of Bengal and therefore it is relatively dry towards the end and beginning of the year. The SW monsoon brings heavy rain to the coastal areas as the wind is laden with moisture it had picked up when crossing the Indian Ocean. Paris in France, Moscow in Russia Characteristics: Four distinct seasons of spring, summer, autumn and winter due to the tilt of the earth and its revolution around the sun. Total annual rainfall is lower between mm and mm. There are no distinct wet or dry seasons. Describe and explain the weather and climate of Singapore with reference to rainfall, relative humidity and temperature. Singapore experiences the hot, wet equatorial climate. Mean annual temperature is high at about Surrounded by water and accompanied by the high temperatures, especially at mid-day, leads to a high evaporation rate. The air is humid or saturated with water vapour by late afternoon. The dry- bulb reading will fall with temperatures towards night, closing the gap between the readings on the two thermometers. Since the wet bulb depression becomes very low, relative humidity is very high at around Total annual rainfall is high at about 2, mm. Most of the rain in Singapore comes from convectional rain. However the northeast monsoon does bring more rain to Singapore from Oct to Feb amounting to about 1,mm as it crosses the South-china sea and picks up more moisture.

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