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Suggested Answers to 2018 O level Geography 2236/ Paper 2

Section A

1(a) When there is cloud cover, daytime temperatures are lower whereas when there is no cloud cover, daytime temperatures are higher. This can be seen from the high temperature experienced when there is no cloud cover at 14:00, at 30°C whereas when there is cloud cover at 14:00, the temperature was around 23°C. When there is cloud cover, however, nighttime temperatures are higher whereas when there is no cloud cover, nighttime temperatures are lower. As such, the more the cloud cover, the smaller the diurnal temperature range.

1(b) The higher the altitude, the lower the temperature. This is because, at higher altitudes, air is less dense and therefore less able to absorb heat. As such, temperatures are lower. Additionally, the atmosphere is mainly heated by longwave radiation (heat energy) from the earth's surface (land or sea surfaces). Thus, the higher the altitude, the cooler the air temperature. With increasing altitude or elevation, the air becomes less dense and contains less dust and water vapour. Heat from the earth's surface thus escapes more rapidly, thereby lowering the air temperature.

1(c)(i) The appearance of the rift valley and block mountain seen in Photograph A seems like they are mostly covered with green vegetation. The block mountains are characterised by steep slopes, separating it from the rift valley. Also, it is clear that the rift valley is a linear depression located far away from the block mountain. The block mountains also have varying rock layers, as seen from the different colours of rocks. Additionally, the rift valley has also been inundated with water, forming a stream.

1(c)(ii) Rift valleys and block mountains are formed when two continental plates diverge. When two continental plates diverge, the tensional forces will pull the two plates apart causing rocks and fractures to form at the fault line. This causes the middle block to sink, forming the rift valley. The uplifted parts are also known as block mountains, and they are typically characterized by steep sides.

1(d) Living in volcanic areas can be both risky and beneficial. One risk includes destruction by volcanic materials leading to the loss of lives, but there are also benefits such as fertile volcanic soil and precious stones and minerals that could be found in volcanic areas.

Volcanic materials produced by volcanic eruptions include lava and rock fragments or volcanic bombs. These volcanic materials can lead to widespread damage to property. Volcanic bombs of heated rocks can fall in areas surrounding the volcano and cause damage to property. These volcanic bombs can range in length from several centimetres to the size of cars. The ongoing eruption of Kilauea in Hawaii since 1983 has destroyed

many homes and highways. When this volcanic material destroys property like houses and kill livestock, people in the area risk losing their homes and economic livelihood.

However, one benefit of living in volcanic areas is the fertile volcanic soils. Lava and ash from volcanic eruptions break down to form fertile volcanic soils. Volcanic rocks are rich in mineral, and it would be available after the rocks have been weathered down and broken down over thousands of years. The volcanic soils of Java and Bali in Indonesia support the cultivation of crops like tea, coffee and rice. The presence of volcanic soil is the main reason why the two islands can support a large rural population over many decades. Despite the continuous use, the volcanic soils in Java and Bali are more fertile than the soils in most non-volcanic areas of Indonesia. As a result, many people continue living in volcanic areas using fertile soil to grow high yielding crops and make a livelihood despite the risks.

Another benefit of living in volcanic areas is tourism. Volcanic areas offer a variety of activities for tourists to engage in. Many people visit volcanoes to hike and camp in the area or to enjoy the scenery. Volcanic areas are rich in history, and people can visit these areas to learn more about them. The ruin of Pompeii, Italy, is an example of a historic visit. The Roman town of Pompeii, Italy, was buried by layers of ash from the nearby Mount Vesuvius when it erupted in 79AD. The unearthed archaeological site has revealed buildings, pottery and mosaic left intact. Almost 3 million people visit the site every year. Therefore, people live near volcanic regions to make a living out of offering services like tours and hotels to tourists visiting the area.

2(a) Areas experiencing cool temperate climates are generally found between 45°N and 60°N and S of the equator as seen in Fig. 3. These places tend to have four distinct seasons of spring, summer, autumn and winter due to the tilt of the earth and its revolution around the sun. Also, these places tend to have low mean annual temperature due to its high latitude. Due to the high latitude, the solar radiations strike this part of the earth at a lower solar angle, causing sun rays to be spread out over a wider area thus of lower concentration, resulting in cooler temperatures. Also, due to the lower temperatures, they are unlikely to experience high rainfall as rates of evaporation may not be high, hence reducing the possibility of convectional rain. Thus, these areas tend to receive moderate amounts of rainfall of about 300mm to 900mm. However, these areas are generally located close to the coast, which helps it to have a maritime effect. The 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. Thus, coastal regions have a cooler summer and a warmer /milder winter than inland regions. The annual range of temperature in coastal regions is, therefore, smaller than that in inland regions.

2(b) In general, most of the wind in Dunedin is facing the North and North-northeast direction as about 1000 hours per year; the wind is blowing towards these two directions. Coming second in place is towards Southwest at more than 750 hours a year. On the contrary, the least winds are blowing towards East, Southeast and East-South-East at less than 250 hours a year.

2(c) During a volcanic eruption, particles of sulfur dioxide, carbon dioxide, water vapour, ash and dust are emitted. Sulfur dioxide released from volcanic eruption may react with water vapour and other chemicals in the atmosphere to form sulfur-based participles which can reflect the Sun's energy back into the atmosphere and also prevent solar energy from entering the lower atmosphere. This may result in the temporarily cooling of the earth. However, as sulfur dioxide is a greenhouse gas, it will also trap heat in the long term resulting in an enhanced greenhouse effect.

2(d) Singapore utilises three main strategies to combat climate change. They are the Singapore Green Plan, Green Mark Scheme and the Plant-A-Tree programme. The Green Plan is to generate 60% of Singapore's energy needs using natural gas by 2012 as it is a cleaner form of energy compare to coal as it does not produce smoke. Under the Green Mark Scheme, buildings evaluated and certified according to how energy-efficient and environmentally friendly they are. It also serves to encourage the construction of more new 'green' buildings.

2(e) I agree that the main human activity that has contributed to the enhanced greenhouse effect is deforestation. That said, there are other human activities that contribute to the enhanced greenhouse effect, such as industrialisation and agricultural activities.

Deforestation refers to the removal of forests. When forests are cleared or burnt, stored carbon is released into the atmosphere, mainly as carbon dioxide. Deforestation accounts for around 18% of all global greenhouse gas emissions due to human activities. In addition, trees and other plants absorb carbon dioxide from the atmosphere as they grow. When they are removed, there would fewer greenhouse gases removed from the atmosphere, thus leading to an enhanced greenhouse effect. Deforestation also exposes soil to sunlight which causes soil temperature to increase, and consequently the rate of carbon oxidation in the soil. As such, deforestation increases the rate at which carbon dioxide is released from the soil into the atmosphere resulting in an enhanced greenhouse effect.

Agricultural activities refer to the farming of plants and rearing of livestock for consumption. The cultivation of crops requires the use of inorganic fertilisers which increases the amount of nitrous oxide in the soil. Nitrous oxide is released when the soil is ploughed or when rain flows through the soil. Nitrous oxide is a form of greenhouse gas that is released through human activities that leads to the enhanced greenhouse effect. Furthermore, plantations utilise tractors and other machinery after the green revolution. These machinery require power to run, which requires the burning of fossil fuels, thereby producing greenhouse gas. Cattle farming also contribute to greenhouse gas emissions because cattle release methane as a waste gas. Millions of tonnes of methane are released each year from cattle farming.

Industries such as manufacturing involve the burning of fossil fuels that result in greenhouse gas emissions. Greenhouse gases are also released as by-products when goods are produced. Some processes or products result in greater emissions than others. With development, countries such as China and India are contributing more to global carbon dioxide emissions due to rapid industrialisation which also leads to an enhanced greenhouse effect.

In conclusion, deforestation is the main human activity resulting in enhanced greenhouse effect because, for industries and agriculture to take place, deforestation must take place first. Hence, deforestation is the main cause of the enhanced greenhouse effect.

Section B

3(a) China. This is because China's consumption of starchy staples, fruits and vegetables as well as fats and sugar does not deviate that much from the recommended food consumption. This is in view of starchy staples deviating by +1%, fruits and vegetables exactly the same as recommended and fats and sugar deviating +8%. All countries deviated from recommended the most the food group of legumes and nuts, including China but the difference is a mere -19%. This is in contrast to USA's consumption of fats and sugars which is +32% of recommended and Bangladesh's consumption of starchy staples which is +32% more than recommended.

3(b) Political factors can lead to variation in food consumption between DCs and LDCs. LDCs lack access to technology or finances to implement technology to increase crop yield and to open up new areas of agriculture. This is because LDCs may be plagued by civil war due to the lack of stability in governance. This leads to instability in governance and thereby causing food shortages as people will be fearful for their own lives to carry out agriculture or even work, leading to a decrease in crop yield and a decrease in income. With the decline in incomes, individuals are unable to purchase food resulting in a decline in food consumption. In addition, unstable governments are incapable of ensuring a stable food supply unlike that of DCs. For instance, in DCs, food stockpiling is carried out in anticipation of shortages due to natural disasters. As such, DCs typically do not run out of food. DCs are also able to diversify their food supply and forge good diplomatic relations with other countries ensuring that they will always have a stable food supply. As such, food consumption in DCs is more than that of LDCs.

3(c)(i) In general, both the DC and LDC saw an increase in food consumption from 1965 to 2015. The DC consumed 260 calories of meat per person per day in 1965 and 280 calories in 2015. The DC consumed about 48 calories of meat per person per day in 1965 and 290 calories in 2015. The rate of increase was slow and steady in the case of DC, where change is of only 7% whereas meat intake for LDC increased 83%. In addition, the DC has always consumed more meat than the LDC up to 2007. The reason for the rapid increase in meat intake in LDC could be due to economic developments. When a country is more economically developed, its citizens yield higher income and are therefore able to shift from starch and carbohydrates to consume more meat.

3(c)(ii) In general, the higher the malnutrition rate, the higher the percentage of household income is spent on food. This means that these people have lower disposable income. As such, they can afford lesser food. In addition, people who spend huge proportions of their income on food are more likely to be affected by changes in food prices.

3(d) Poor health such as obesity is a serious impact of excess food consumption. However, there are also other impacts of excess food consumption such as decreased productivity and placing a greater strain on the economy.

Obesity is the condition of having excessive fat accumulation due to overconsumption of nutrients, to the extent that it may have a negative impact on health. People who are obese may suffer from health problems such as high blood pressure, diabetes and certain cancers. Obesity is more common in DCs because people in DCs typically have a higher amount of disposable income to purchase more food. However, it is also becoming more common in economies like those of the BRIC nations because growing affluence leads to an increase in food consumption and overconsumption.

Excessive consumption of food can also lead to lowered productivity. People who over-consume food may be more prone to obesity-related illnesses or health issues and hence may take more sick leave. When people fall sick, there will be lowered productivity due to the loss of work days. This causes workers to have lesser hours at work, and children to miss out on educational opportunities thus leading to a less productive society which would mean lesser investments for the country, which may lead to a decline in a country's economy.

In addition, excess food consumption may also lead to an even greater strain on the economy as funds are diverted to healthcare. Public health expenditure is likely to rise due to the rising number of sick individuals as a result of obesity-related health conditions such as diabetes and heart disease. When more people are ill, the government will have to divert more funds to healthcare, leaving fewer resources for other aspects of a country's wellbeing such as education and economic development. For instance, the US has the highest amount of money spent per capita on healthcare partially as a result of the increased prevalence of obesity.

In conclusion, I agree that poor health is the more serious impact of excess food consumption because the other two factors mentioned first stemmed from the fact that these individuals are suffering from poor health, hence cannot partake in the economy and have to be taken care of instead, thus becoming a burden to society.

4(a) The areas in the world which had a decrease of 50% or below in death rates from malaria between 2000 and 2013 are mainly found in the southern hemisphere. For instance, a large part of the South American continent such as Bolivia, Brazil and Peru as well as a large part of African continent such as Congo, Tanzania and South Africa. However, there are also some countries with a decrease of 50% or below in death rates found in the northern hemisphere, for example in China and the northern parts of Africa.

4(b) By distributing mosquito net at a large scale, individuals will be protected from being bitten by the mosquitoes and thereby, there will be lesser chances of people contracting malaria hence lesser deaths by malaria. By doing thermal fogging on a local and national scale, it will kill adult mosquitoes found outdoors thus leading to fewer mosquitoes, containing the spread of malaria, hence resulting in fewer deaths. By carrying out national and regional campaigns for behavioural change, individuals may be more conscious about the conditions required for mosquitoes to breed and thus avoid these conditions, thus lesser mosquitoes would be bred and lesser deaths would be caused by malaria. In addition, by training and supporting community health workers and volunteers, the country would be more advanced in the treatment of malaria-infected individuals thus lowering the death rates, and there would be improved healthcare and treatment rates.

4(c) Countries affected by malaria would need to set aside funds for the provision of healthcare to address the disease. Additionally, people with malaria might not be able to work due to their poor health. This results in a loss of productivity of the workforce, which may result in slower economic growth. In addition, the economic burden of malaria on individuals and households may include increased medical expenses. For individuals in less developed countries, this may cause further monetary constraints which may mean less money for food and clean water, which may result in increased vulnerability. This is a vicious cycle as there would be fewer workers to work, slower economic growth and thus less attractive for foreign investors to invest in the country.

4(d) This is because area A experiences higher temperatures as compared to area B. The mean annual temperature of area A is 22.2 degrees Celsius as compared to area B's temperature of 7.9 degrees Celsius. The higher temperature provides a more conducive environment for plants to grow as crops require sunlight to photosynthesise. In addition, area A also receives a higher annual rainfall of 1937mm as compared to area B's 438mm. High temperatures and high rainfall enable more crops to grow, more quickly hence allowing higher crop yield.

4(e) Political, physical and social reasons can cause food shortages.

Political factors such as civil strife and poor governance may affect food supply. Civil strife is a situation in which a country faces major internal conflicts, which may include riots, unrest or civil war. It can also lead to disputes over the control of resources that affect food production, such as land and water. These resources may even be destroyed, which in turn would hinder food production. For example, landmines planted on farmlands can reduce or completely stop food production during and after a conflict. Sometimes, the lack of food supply is the cause of conflict, which can then start a vicious cycle of civil strife and a shortage of food.

Physical reasons such as climate change may also cause a food shortage. F Changes in climate may cause existing farmland to become unsuitable for farming while lengthening in the growing season in other areas. As a result, crops may no longer be able to grow in some areas which were previously suitable for farming. Similarly, crops may be farmed in certain areas that were not suitable for farming in the past. When global temperatures increase, it is projected that some countries and regions across the world will see their current food production decrease by up to 50%. The shrinking of glaciers due to global warming is predicted too, to reduce food supply as it could result in a loss of water during dry season, resulting in a smaller harvest for farmers thus causing food shortages.

Social factors can also affect the production, distribution and supply of food. For instance, there may be a lack of accessibility in food supplies. Transport facilities such as road and rail links must be made available so that food can be reached even by people who live far away from shops. However, even when food is available within a country, how accessible it is may depend on the number and location of food outlets. In LDCs for example, food outlets may be few and far apart from one another, and as a result, people can obtain fresh produce and thus have a smaller food intake.