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GEOGRAPHY

Trial Examination Paper, 2024

GUIDELINES FOR STUDENT RESPONSES

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Note: Numbers in brackets indicate the number of marks allocated

Question 1 (6 marks)

Students must identify the major trend of decreasing ice mass and quantify the overall loss during the time period (1 mark). Students must also provide detail about the variation in ice loss within this period with references to the average rate of loss and/or peaks and troughs (1 mark). After describing the overall trend, students should describe the ice mass change in Antarctica, identifying and quantifying regions of ice gain (2 marks) and ice loss (2 marks) with the use of the legend.

Antarctica has experienced an overall decrease in ice mass between 2002 and 2016. Following a small growth of 149 gigatons in September 2002, there has been an overall mass loss of 1878 gigatons to 2016, an average loss of 125 gigatons per year. Ice loss across Antarctica has been uneven. Most of the loss has occurred on the western coast with a large area of -3 metres water equivalent to 2002 covering less than 5% of Antarctica. Less severe melting has occurred in small regions in the northwest and southeast coast at around -1 metres. The central region surrounding the South Pole has had a slight decrease of around -0.5 metres. In contrast, central Western Antarctica and northern Antarctica have experienced ice gains of up to 1 metre, covering an area of around 5% of Antarctica, while much of central Antarctica has remained unchanged.

Question 2 (9 marks)

- a. Students must identify an appropriate natural process and human activity (1 mark each) and elaborate by providing additional detail for each (1 mark each). Students must explain the interconnection between these processes, demonstrating the influence one has on the other or the link between them (1 mark). If a student discusses two natural processes or two human activities, a maximum of two marks will be awarded.

The accumulation of atmospheric greenhouse gases due to human activity has led to anthropogenic climate change in which the global temperature has increased by 1.04°C between 1880 and 2021. As a result, ablation has exceeded accumulation, causing the retreat of 97% of the earth's glaciers. This has occurred in Bhutan where glaciers are melting at an average rate of 30 – 60m per decade. In addition, Bhutan experiences excessive melting during heatwaves, a natural process in which warmer weather is experienced over a period of several days. In 2019, a heatwave lasting 9 days increased national temperatures by an average of 2°C, leading to the rapid melting of glaciers in Bhutan's northern region. Heatwaves and anthropogenic climate change are interconnected as heatwaves occurring within a warmed climate result in even warmer temperatures and more severe glacier retreat. In addition, anthropogenic climate change is expected to increase the frequency and magnitude of heatwaves with a projected 20% increase in the likelihood of heatwaves in Bhutan by 2100.

- b. Students are required to identify a suitable global or national response (1 mark). No marks will be awarded for responses outlining a local-scale response. Students must demonstrate how this response is implemented at a specific location (1 mark). A specific location may be interpreted as an entire country or a location within a country. Additional elaboration is required such as the aim of the response, the group implementing it, timelines and relevant quantification (2 marks).

The World Glacier Monitoring Service (WGMS), established in Zurich in 1968, is an organisation in which scientists from 35 countries from across the world gather information regarding the distribution and mass balance of glaciers to monitor global trends. Information is used in countries such as Bhutan to determine the likelihood of Glacial Lake Outburst Floods (GLOFs), especially in remote areas in the north, such as Thorthormi glacier, in which field data is difficult to collect. The WGMS collects data from 130,000 glaciers worldwide (65% of total glaciers) with the aim of providing an extensive worldwide inventory of glacial records. Information is gathered remotely using satellite data as part of the 'Global Land Ice Measurements from Space' initiative and is managed using the Fluctuations of Glaciers Geographic Information System. Information is accessible across all countries and is used to inform management strategies such as the implementation of GLOF warning systems.

Question 3 (10 marks)

Students need to outline the impacts of deforestation on social or economic conditions. This must include at least two impacts to achieve full marks. Discussing environmental impacts, or any other classification of impact, will not gain any marks. Similarly, only one of social **or** economic impacts should be discussed. The significance of these impacts must be explained and justified with the use of some form of evidence such as quantification. At least two sets of issues and challenges need to be outlined, each clearly linking to one of the impacts explained.

8–10 marks	Responses are very clear and have answered all aspects of the question in detail. They include: • a detailed explanation of two or more suitable impacts of deforestation • a clear statement of the significance of these impacts and an appropriate justification with the use of evidence • an explicit and relevant link to a selected location • an outline of two sets of issues and challenges, each one clearly linked to an appropriate impact • the appropriate use of data/statistics, elaborations and geographical terms and concepts throughout the response.
6–7 marks	Responses answer most parts of the question well but lack sufficient details in some areas. They include: • a brief outline of two or more suitable impacts of deforestation • an attempt at outlining the significance of these impacts

	• a link to a suitable location • an outline of at least one issue and/or challenge with an attempt to link these to an appropriate impact
3–5 marks	Responses address some parts of the question. A basic understanding of the question is demonstrated although responses lack sufficient detail and depth. They include: • a brief outline of one or more impact of deforestation • little or no reference to a suitable location • a brief discussion of an issue and/or challenge linking to an impact
1–2 marks	Responses do not adequately address the question or contains lots of incorrect information. Insufficient detail is included in outlining appropriate impacts. A suitable location is not discussed. Issues and challenges are not outlined appropriately.

Deforestation is causing a range of social impacts in Cameroon. The timber industry is allowing many Cameroonians to escape poverty and increase their quality of life. Cameroon's timber sector employs 27,000 people directly and an additional 250,000 people indirectly, which is assisting with the development of the country. This is a significant benefit to employees who would otherwise live primarily as subsistence farmers. Logging infrastructure such as road networks and the Trans-Cameroon railway have been constructed as a result of the booming industry, increasing the connectivity of the country. However, an issue that has resulted from this development is that the increase in logging roads have facilitated the spread of deforestation deeper into forests, displacing villagers and fragmenting their forests. Villagers in regions such as Nomedjoh, southeastern Cameroon, have been forced to relocate to roadsides. This challenges the traditional lifestyles of villagers such as the Baka people as they no longer have access to forests for foraging, hunting and participating in traditional rituals. They have also lost access to non-timber products such as medicinal plants, both for personal use and as a source of income.

The social benefits of deforestation are greatly diminished due to illegal logging. Locals in places like Nomedjoh constantly witness logging trucks carrying illegally felled timber driving through their village. This includes the protected Moabi species which is sacred to locals and which provides fruits used to create oil for cooking and cosmetics. Illegal logging is an issue because locals do not benefit from the deforestation, with profits going to multinational companies in other countries. Furthermore, government corruption leaves locals powerless in reporting or attempting to halt illegal activity as illegal loggers obtain permits via bribery. This issue is severe with Cameroon's level of corruption ranked 142nd out of 180 countries in 2022. The remoteness and vast size of logging coupes adds to the challenges as locals do not have the resources to monitor and report illegal logging and government authorities do not have to apprehend illegal loggers.

Question 4 (15 marks)

Students should clearly state the location of their fieldwork site. Although no marks are awarded, it is necessary to provide context for the assessor.

We investigated the former Boronia Heights Secondary College development site at 40 Mount View Road, Boronia.

- a. Students must clearly state the type of land use change that has occurred or is occurring (1 mark). This should include what the land use has changed from and what it is changing to. A reason for the land use change must be stated (1 mark) with some form of elaboration such as additional detail and/or evidence (1 mark). In addition, students must link an additional reason for change to a planning strategy such as a masterplan or council planning scheme (1 mark). This planning strategy must link clearly to the reason for the land use change (1 mark).

The Boronia Heights Secondary College site is currently undergoing land use change from an educational facility to a residential development containing up to 800 houses. The site is unique in that it contains significant pockets of indigenous vegetation, some of which will be cleared as part of the development process. The site is particularly suitable for development because it is located near existing infrastructure and facilities such as major roads, schools and a retail precinct. The site is also relatively flat, and the previous buildings have already been cleared as they were a safety concern. These factors mean construction will be relatively quick and highly profitable. The primary reason for development is the need to provide affordable housing to cater for population growth in the City of Knox. According to the Knox Planning Scheme, an additional 12 thousand houses are required within the region by 2031. This site is one of many within the Local Government Area that will be developed to facilitate this growth.

- b.** Students must include a suitable research question (1 mark). In order to be awarded the mark, it must be phrased appropriately as a question. Students must identify one appropriate source of primary data such as surveys, soil tests, a field sketch or species identification (1 mark). There must be a clear explanation justifying how the primary data collected assists in answering the research question (2 marks).

My research question is 'What are the positive and negative impacts of land use change at the former Boronia Heights Secondary College site?'. In order to investigate the potential environmental impacts of the residential development at the site, we undertook an assessment of the site's indigenous vegetation. This involved identifying both the diversity and abundance of trees, shrubs and grasses with assistance from Richard Faragher, president of the Knox Environment Society. Vegetation was sampled from three sites, allowing us to determine the health of existing remnant vegetation and the potential degradation of these sites as the residential development takes place. We also assessed the spread of invasive weeds in areas where indigenous vegetation had been cleared due to site works. This primary data source clearly showed the negative environmental impact of the land use change from educational to residential, thus answering the research question

- c.** Students must make it clear whether their discussion of each impact is based on the fieldwork site or its surrounding region. Each positive and negative impact must be identified with sufficient detail (1 mark each). Each impact must be evaluated, which involves a statement of the significance of the impact and the reason for this evaluation (1 mark each). Supporting evidence must be included to justify the evaluation (1 mark each). This should link to primary or secondary data.

*Our vegetation assessment concluded that the residential development at the site will lead to a loss of biodiversity and the potential local extinction of rare species. Two small pockets of *Lomandra multiflora* were identified in the central region of the site. These grasses are critically endangered in the region. According to the Knox Environment Society, the loss of these grasses in the development process would be a severe negative environmental impact. Despite this potential negative environmental impact, the development is likely to have a positive economic impact in the surrounding region. A survey of local business owners located in Boronia's retail district 500m west of the site revealed an overwhelming positive attitude towards the development. Over 70% of business owners were in favour of the development, hoping that the proposed addition of up to 800 households will increase patronage and provide a boost to Boronia's local economy.*

Question 5 (8 marks)

- a. Students should provide an appropriate definition, identifying it as the average number of children a woman has during their lifetime. They should be careful not to provide the definition for birth rate. (1 mark)

The total fertility rate is the measure of the average number of children a woman will have in her lifetime.

- b. Students should clearly identify factors – one linking to a high TFR (1 mark), and one to a low TFR (1 mark). They should elaborate on each (1 mark each), using an appropriate example. Students should easily be able to draw on their case studies of a growing and ageing population.

One factor that would contribute to a country having a high total fertility rate could be lack of availability and use of contraception. A country such as Niger has a low rate of contraceptive use (12% in 2023) due to cultural beliefs unsupportive of contraceptive use.

A factor that would contribute to a low TFR would be women's education levels. In a country such as Germany, women are well educated and often delay marriage and having children until they have finished their education. This is shown by the average age of 30.4 years in 2022 for first time mothers in Germany. This results in a shorter period of having children, and a low TFR.

- c. Students should be able to identify Country X as growing (1 mark) (although the rate of growth has slowed in recent years). They should be able to explain that the high proportion of women in their reproductive years means the birth rate will still be relatively high (1 mark). They should use evidence from the data to support their statements (1 mark).

Country X's population is currently growing. While its birthrate is declining, it still has many people in the reproductive age brackets (approximately 8% each cohort for 25-39 year olds), and population momentum will ensure the country grows into the future (at least until after 2030).

Question 6 (6 marks)

- a. For this question, students needed to outline what occurs in stage 4 of the DTM – stable population increase (1 mark), and low and stable birth and death rates (1 mark), and then use appropriate data from the table to support their statements. (2 marks).

In stage 4 of the DTM nations typically have low stable birth and death rates. Birth rates are slightly higher than death rates so we see a slow population increase.

This can be seen in Country Y as the birth rate is 11.11 per 1,000 and the death rate is 9.37 per 1,000, with a population growth rate of 0.12%.

- b. Students need to outline an appropriate issue (1 mark) that a country with an ageing population (1 mark) might face - such as high old age dependency ratio, pressure on healthcare and welfare systems, etc.

Country Y will be in stage 5 of the DTM in 2050 and may experience an issue such as pressure on the pension system as there will be an excess of old people and not enough in the working age groups to support them. This is common in countries with an ageing population.

Question 7 (8 marks)

For this question, students needed to demonstrate an understanding of Malthusian theory, its relevance today, as well to as make connections with population projections by looking at future population trends. The question needed students to examine a range of data and use several pieces of supporting evidence in their response.

6–8 marks	The response is very clear and answers all aspects of the question in detail: It includes: • a clear contention outlining the extent to which Malthus’ hypothesis is supported • a concise outline of Malthusian theory, including positive and preventative checks • a clear statement about its relevance in the future • an assessment of the theory, using a of number of pieces of supporting data from figures 5 & 6.
3–5 marks	The response answers most parts of the question well. A good understanding of the question is demonstrated but some aspects lack sufficient detail. The response includes: • a brief outline of Malthusian theory • a statement about the relevance of Malthusian theory today and/or in the future. • use of evidence from figures 5 and/or 6 to support some statements
1–2 marks	The response does not adequately address the question or contains lots of incorrect information. Insufficient detail is included, and the student has not demonstrated an understanding of Malthusian theory nor made connections to its relevance today or in the future.

In the 21st century, global population growth has continued, although the rate of growth has slowed compared to previous centuries. Over time, advancements in agricultural technology including the Green Revolution, which introduced high-yielding crop varieties and increased use of fertilizers and pesticides; and the Blue revolution which saw improved irrigation techniques and practices, have also increased food production significantly.

Malthus' hypothesis theorizes that exponential population growth will eventually outstrip food production, eventually leading to food shortages and famine. There have been times when Malthus' theory has been relevant, for example, during widespread agricultural disruption and food shortages in the early 18th century before mass migration to the New World and the opening of vast agricultural lands for cultivation, and in the late 20th Century, when population boom and droughts resulted in famine in Sub-Saharan Africa. However, the data in figures 5 & 6 proves this to be untrue. Figure 5 shows that the population grew exponentially in the 20th century, growing from 2 billion in 1925 to 8 billion in 2023. If Malthus was correct, we would then see a decrease in caloric intake as food supplies would be inadequate. This is not the case, with caloric intake increasing from 1961 to 2020 – the world average in 1961 was 2200kcal per person, to 3000kcal per person in 2020.

Malthus' Hypothesis does remind us that we must be mindful of environmental degradation and the impacts of climate change on food production now and into the future as evidenced by regions such as Sub-Saharan Africa. However, on a global scale, the future Malthusian theory is likely to have little relevance, at least at a global scale – world population is expected to peak at around 11 billion before the end of this century, and possibly even decline. Further, agricultural technologies only continue to improve, creating the capacity for more resilient crops, increased yields and easier distribution of goods between regions.

Question 8 (8 marks)

- a.** For this question, students needed to provide a suitable example of international migration, clearly referencing emigration from a country of origin or migration to a destination (1 mark). They need to outline the reason migration occurred (1 mark) and provide supporting data or detail (1 mark).

Lebanon is a country that has experienced international migration. The Syrian Civil War which started in 2011 caused over 1 million people to flee to Lebanon.

- b. Students need to use the above location or no marks are awarded. They need to outline the extent of the change to the population structure (1 mark), justifying the change (1 mark) and providing supporting elaboration, with specific reference to either age or sex of population (3 marks). Students could provide a sketch of a population pyramid to support their response if they liked.

Lebanon has the highest refugee ratio in the world, approximately 1 in 4 people in Lebanon is a refugee. Before the Syrian war, Lebanon's population was approximately 5 million. Approximately 1.5 million Syrian refugees migrated to Lebanon causing the population to grow by 125% in a very short period. Over half the refugees were children, leading to a higher dependency ratio.

Question 9 (10 marks)

This question required students to clearly explain a geospatial technology linked to a growing population. They needed to be able to clearly articulate an issue and evaluate the effectiveness of the geospatial technology as responding to the issue.

9-10 marks	Responses are very clear and have answered all aspects of the question in detail. They include: - Clearly identified and explained a geospatial technology - Detailed an issue and clearly linked it to a growing population - Evaluative statement - Supporting evidence and quantification included, and covers a range of elements.
7-8 marks	Responses answer most parts of the question well but lack sufficient details in some areas. They include: - Geospatial technology clearly outlined - Issue is linked to growing population, and outlined in some detail. - An evaluative statement may be included - A range of supporting evidence and elaboration is included.
4-6 marks	Responses address some parts of the question. A basic understanding of the question is demonstrated although responses lack sufficient detail and depth. They include: - Geospatial technology is identified but not very clearly elaborated on - Issue is alluded to or briefly outlined - An evaluative statement may or may not be included - Some quantification and supporting evidence is included.
1-3 marks	Response does not adequately address the question or contains lots of incorrect information. - Geospatial technology is not clearly outlined - Issue is possibly identified, may not clearly link to growing population - Very limited quantification or supporting evidence

In Niger, the government used Geographic Information Systems mapping to evaluate the location of healthcare centres in relation to population distribution and road access. The study 'It's a long, long walk' was conducted in 2011 and used a range of layers on GIS maps, such as population distribution, location of healthcare facilities, and roads in both the wet and dry seasons. These layers were analysed to determine the interconnection between population and the location of healthcare facilities.

One population issue that Niger faces is a lack of contraceptive use, linking to the highest total fertility rates in the world (6.7 per woman). While cultural factors play a large role in the low contraceptive use (less than 15% of women use contraception in 2023), access to contraception is also a barrier. If healthcare services are accessible then contraceptive use would hopefully improve.

Using geospatial technology in this study allowed the government to determine the location of additional healthcare services to ensure improved access for almost 1 million people. Ninety per-cent of roads in Niger are unpaved, and the main mode of transport is walking, and previous studies had also not taken into account road access in the wet season.

The study found that during the dry season 39% of the population was within 1-hours walk to a health centre, with the percentage decreasing to 24% during the wet season. They also identified three key geographic areas where access to health centres took greater than 4 h walk during the wet and dry season.

Overall, the findings of the effective study concluded that access for more than 730,000 people can be improved in these areas with the addition of 17 health facilities to the current total of 504 during the dry season (260,000 during the wet season).