THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

113/1 **GEOGRAPHY 1**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2005**

Instructions

1. This paper consists of section A, and B with total of 13 questions.
2. Answer a total of five questions; two in section A, and three in questions in section B. Question number 1 is compulsory.

1. Study carefully the map extract of Musoma, sheet provided, then answer the questions that follow.

(a) Calculate the forward and backward bearing of Ryamugasile Island grid 930340 from Buhare Home Economics Training Centre grid 868324.

The forward bearing is calculated using the formula:

Forward bearing = $\arctan((E_2 - E_1) / (N_2 - N_1))$

where E_1, N_1 are the eastings and northings of the first point, and E_2, N_2 are the eastings and northings of the second point.

Backward bearing is obtained by adding or subtracting 180 degrees from the forward bearing.

Without precise coordinate values, this needs to be measured directly from the map using a protractor.

(b) Outlining steps, redraw the map provided using the map scale as 1:100,000 and show the following features:

(i) Musoma – Butiama road.
(ii) Musoma – Mugango road.
(iii) Lake Victoria and Ryamugasile Island.
(iv) Chanyalulinga and Nyabokwabisi hills.
(v) Airfield.

To redraw the map:
- Reduce the dimensions of the original map based on the new scale.
- Identify and plot major landmarks including roads, lakes, hills, and the airfield.
- Ensure correct representation of distances and orientations.
- Label all required features clearly.

(c) Examine the two maps and comment on the impact the change of map scale has on the map area and its contents.

A change in map scale affects:
- The level of detail; a smaller scale reduces detail, while a larger scale provides more information.
- The representation of distances and features; features may appear smaller or more generalized.
- The extent of the area covered; a reduced scale covers a larger area but with less detail.
- The readability of small features such as minor roads and settlements, which may be lost in a smaller scale.

(d) Using the map extract given, write short notes on:

(i) Land use.

The map indicates a mix of land uses including urban development in Musoma township, agricultural land surrounding the area, and water bodies such as Lake Victoria used for fishing. Some areas may also be designated for conservation or forestry.

(ii) Settlement.

Settlements are concentrated near transport routes, water sources, and economic centers. Musoma township is the primary settlement, with smaller villages spread across the region. The layout suggests planned urban growth with some informal expansions.

(iii) Communication.

The area has a network of roads connecting Musoma to nearby towns and villages. The presence of an airfield indicates additional means of transport. Lake Victoria also serves as a water transport route for fishing and trade.

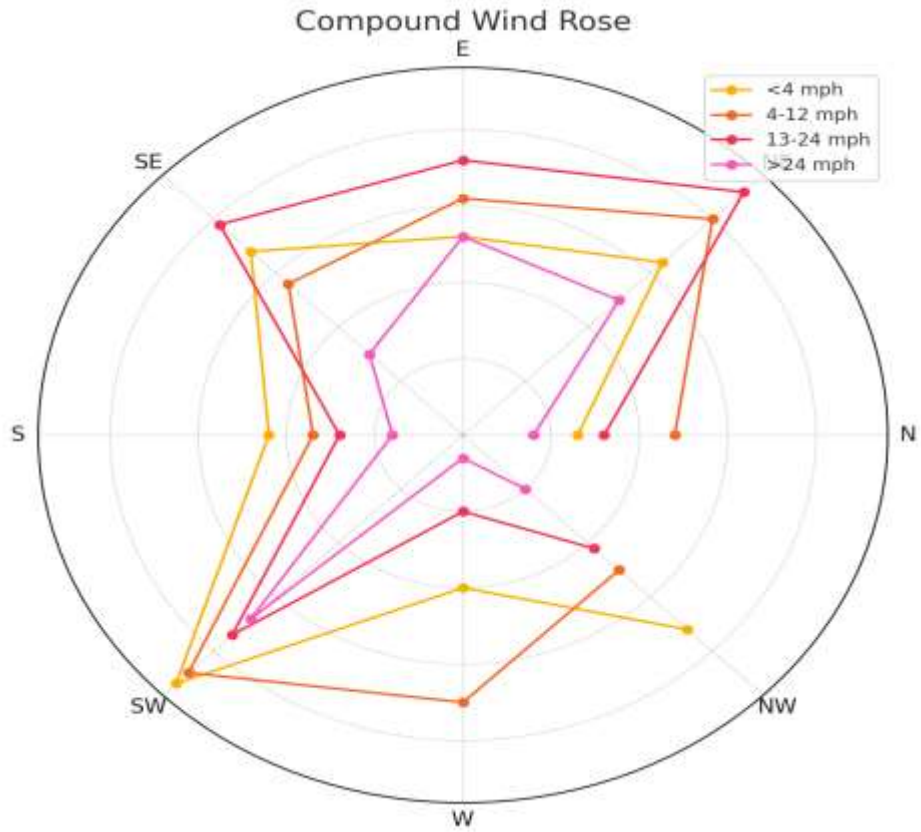
(e) Suggest the possible economic and social influences that might have contributed to the location and growth of Musoma township.

- Proximity to Lake Victoria, which provides water resources, fishing, and transport.
- Agricultural potential due to fertile soils, supporting farming activities.
- Trade and commerce, as Musoma serves as a regional trading center.
- Availability of transport infrastructure, including roads and air transport.
- Historical and administrative significance, attracting government services and businesses.
- Population growth due to migration in search of economic opportunities.

2. The table below shows the mean annual percentage frequency of wind direction and wind speed. Study it carefully then answer the questions that follow.

(i) Display the above data by means of Compound Wind Rose.

A compound wind rose graphically represents the frequency and intensity of winds from different directions. The steps include:
- Creating a circular diagram with eight compass directions.
- Plotting wind speeds as concentric circles, with frequency values extending outward.
- Differentiating wind speed categories using varying line thickness or shading.



(ii) What are the merits and demerits of using this method in presenting statistics?

Merits:
- Provides a clear visual representation of wind direction and intensity.
- Helps in understanding dominant wind patterns, useful for climate studies and urban planning.
- Can accommodate multiple data categories, making comparisons easier.
- Useful in aviation, maritime navigation, and environmental management.

Demerits:
- Requires specialized software or tools for accurate representation.
- Can be difficult to interpret for those unfamiliar with wind rose diagrams.
- May not be effective for datasets with minimal variation, as differences become less noticeable.
- Can become cluttered if too many data categories are included, reducing readability.

3.

(a) Classify the obstacles encountered in chain survey.

Obstacles in chain surveying are classified into two main types:

- Obstacles to chaining. These prevent direct measurement along the survey line but do not obstruct sight. Examples include rivers, ponds, and fences.
- Obstacles to both chaining and sighting. These prevent both direct measurement and line of sight. Examples include buildings, thick vegetation, and large hills.

Each type of obstacle requires different surveying techniques to overcome measurement difficulties.

(b) Suppose A and B were two points on the line approaching an obstacle which you cannot see through, how would you conduct a chain survey across it?

To conduct a chain survey across an obstacle that blocks sight:
- Establish two reference points on either side of the obstacle using perpendicular offsets.
- Measure and record the distances from the main survey line to these reference points.
- Extend the survey line from the opposite side of the obstacle using similar perpendicular measurements.
- Reconnect the main survey line after passing the obstacle to ensure continuity.

This method allows accurate measurement without physically passing through the obstruction.

4. Explain the concept of hypothesis testing.

Hypothesis testing is a statistical method used to determine if there is enough evidence to support a given assumption or hypothesis about a population. It involves:
- Formulating a null hypothesis (H0) and an alternative hypothesis (H1).
- Collecting and analyzing data through statistical tests.
- Comparing results against a significance level to determine whether to reject or accept H0.

This process is used in scientific research to validate theories or identify patterns in data.

5.(a) Describe the characteristics of extraterrestrial photographs.

Extraterrestrial photographs are images taken from space using satellites or space probes. Their key characteristics include:
- High-resolution imaging, capturing fine details of planetary surfaces.
- Multispectral and infrared capabilities, allowing analysis of different atmospheric and surface properties.
- Large area coverage, capturing entire planets or vast regions in a single image.
- Absence of atmospheric interference, providing clearer images than those taken from Earth.

These images are useful in planetary exploration, climate studies, and space research.

(b) Discuss the importance of satellite images in meteorological studies.

Satellite images are essential in meteorology for:
- Monitoring weather patterns such as hurricanes, cyclones, and thunderstorms in real-time.

- Providing temperature and humidity data to improve climate modeling and forecasting.
- Detecting long-term climate changes, such as global warming and ocean currents.
- Assisting in disaster management by tracking storms, floods, and droughts.

These images help meteorologists predict and mitigate the effects of extreme weather conditions.

6. Describe the geological structure which leads to the formation of waterfalls.

Waterfalls form due to geological structures involving:
- Layered rock formations with resistant and less resistant strata, where erosion undercuts softer rocks beneath hard layers.
- Faulting, which creates abrupt elevation changes, causing rivers to plunge over fault lines.
- Glacial action, where ice erosion carves deep valleys, and meltwater forms waterfalls over valley edges.
- Volcanic activity, where lava flows solidify, forming steep cliffs that create waterfalls.

Over time, erosion deepens waterfall plunge pools, leading to further retreat of the falls.

7. Use expressive examples to narrate the roles of plate tectonics theory on the formation of landforms.

Plate tectonics theory explains various landforms through:
- Mountain formation, where convergent plate boundaries create fold mountains like the Himalayas.
- Rift valleys, such as the East African Rift, formed by divergent plate movements.
- Volcanic islands, such as Hawaii, formed over hot spots where magma reaches the surface.
- Ocean trenches, like the Mariana Trench, created by subduction zones where oceanic plates sink beneath others.

These processes continuously reshape the Earth's surface through movement and interaction of tectonic plates.

8. Write short notes on the following:

(a) Plant succession

Plant succession is the natural process by which plant communities change over time in response to environmental conditions. It occurs in two types:
- Primary succession, where new plant life develops in areas without previous vegetation, such as volcanic landscapes.
- Secondary succession, where plant life regenerates in areas disturbed by natural disasters or human activities.

Succession leads to the development of stable ecosystems over time.

(b) Plant community

A plant community is a group of different plant species living together in a particular area, interacting with each other and their environment. The composition of plant communities is influenced by climate, soil, and human activities. Examples include grasslands, forests, and wetlands.

9. How are the coastal characteristics related to emergence and submergence of coastlines?

Coastal characteristics depend on:
- Emergent coastlines, where land rises due to tectonic uplift or sea level drop, forming raised beaches and marine terraces.
- Submerged coastlines, where rising sea levels flood coastal areas, creating rias and fjords.
- Erosional processes shaping cliffs and headlands.
- Depositional processes forming sandbars, spits, and deltas.

Coastal changes are influenced by glacial cycles, plate movements, and climate variations.

10. Investigate the theories which aspire to describe the occurrence of glacial periods.

Theories explaining glacial periods include:
- The Milankovitch Theory, which links ice ages to changes in Earth's orbit, tilt, and precession.
- The Volcanic Activity Hypothesis, suggesting that increased volcanic eruptions release aerosols that block sunlight, cooling the planet.
- The Solar Radiation Variability Theory, proposing that fluctuations in solar energy influence climate changes.
- The Tectonic Plate Movement Theory, which states that shifting landmasses alter ocean currents, impacting global climate.

Each theory contributes to understanding long-term climate cycles and ice ages.

11. (a) Define lapse rate.

Lapse rate refers to the rate at which air temperature decreases with increasing altitude. It is classified into:
- Environmental lapse rate, the actual decrease in temperature with height in the atmosphere.
- Dry adiabatic lapse rate, where unsaturated air cools at about 10°C per kilometer.
- Saturated adiabatic lapse rate, where moist air cools at a slower rate due to condensation.

(b) How does lapse rate assist in the understanding of weather?

Lapse rate helps meteorologists predict:
- Atmospheric stability, which determines cloud formation and storm development.
- Temperature inversions, which can trap pollutants and cause smog.
- The likelihood of convection currents leading to thunderstorms.

12. Give a clear classification of azonal soils.

Azonal soils are classified based on their formation without clear profile development. Types include:
- Lithosols, found in rocky areas with minimal soil formation.
- Alluvial soils, deposited by rivers, rich in nutrients and suitable for agriculture.
- Regosols, formed in sandy environments with weak soil structure.
- Volcanic soils, rich in minerals, derived from volcanic ash and lava.

These soils are influenced more by parent material and deposition processes rather than climatic factors.

13. Consider the global distribution of volcanoes and discuss:

(a) Types of volcanoes

Volcanoes are classified based on their eruption style and shape:
- Shield volcanoes, with gentle slopes and lava flows, such as Mauna Loa.
- Stratovolcanoes, with alternating layers of lava and ash, such as Mount Fuji.
- Cinder cone volcanoes, small and steep, formed by explosive eruptions.
- Caldera volcanoes, formed when a volcano collapses after a major eruption, such as Yellowstone.

(b) Eruptive features of volcanoes

Volcanic eruptions produce various features:
- Lava flows, which spread molten rock over large areas.
- Ash clouds, which impact climate and aviation.
- Pyroclastic flows, fast-moving hot gas and debris.
- Geysers and hot springs, caused by geothermal activity.

These features shape landscapes and influence ecosystems globally.