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: 2022**

Instructions

1. This paper consists of section A, and B with total of seven 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. A team of surveyors moved from point A to B marking an angle of 45° and a distance of 400 m; from point B to C marking an angle of 106° and a distance of 300 m; from point C to D marking an angle of 60° and a distance of 450 m; and lastly from point D to E marking an angle of 80° and a distance of 500 m.

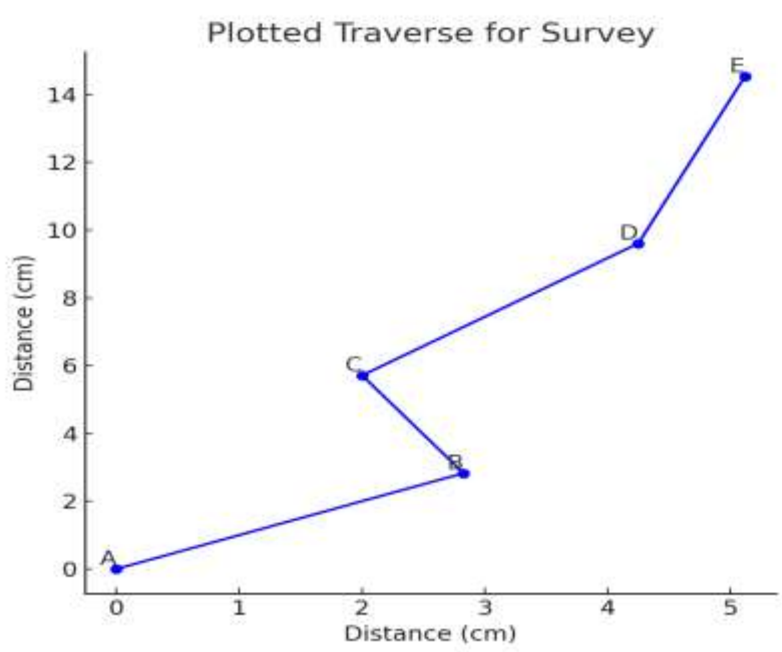
(a) Tabulate the information with its back bearings.

The back bearing is calculated by adding or subtracting 180° from the forward bearing. If the bearing is less than 180°, 180° is added. If the bearing is more than 180°, 180° is subtracted.

From	To	Forward Bearing	Distance (m)	Back Bearing
A	B	45°	400	225°
B	C	106°	300	286°
C	D	60°	450	240°
D	E	80°	500	260°

(b) Plot the traverse using a scale of 1:10000 or 1cm represents 100m.

Each distance is converted to the appropriate scale, where 1 cm represents 100 m.
The traverse is plotted as follows:
i. AB is drawn at 45° with a length of 4 cm
ii. BC is drawn at 106° with a length of 3 cm
iii. CD is drawn at 60° with a length of 4.5 cm
iv. DE is drawn at 80° with a length of 5 cm



(c) Clearly put the data from the traverse into the double entry column book sheet.
The table from part (a) can be transferred into a double-entry column book sheet where each bearing and distance is recorded accordingly.

From	To	Forward Bearing	Distance (m)	Back Bearing
A	B	45°	400	225°
B	C	106°	300	286°
C	D	60°	450	240°
D	E	80°	500	260°

(d) Use the traverse plotted in (b) to explain five possible causes of errors.

i. Instrumental errors occur when the theodolite or compass used is not properly calibrated, leading to incorrect angle measurements.
ii. Human errors arise when the surveyor misreads the instrument or records incorrect values, causing distortions in the plotted traverse.
iii. Environmental factors such as wind, heat, and atmospheric pressure can affect measurements by causing expansion or misalignment of equipment.
iv. Ground conditions such as uneven terrain can lead to variations in measuring distances, especially when chains or tapes are not held properly.
v. Magnetic disturbances can interfere with compass readings, leading to incorrect bearing measurements in areas with metal objects or electrical lines.

(e) How would you fix the errors in (d)? Give five points.

i. Regularly calibrating and maintaining survey instruments ensures that they provide accurate readings and minimize instrumental errors.
ii. Surveyors should take multiple readings and average them to minimize human errors and ensure accuracy in angle and distance measurements.
iii. Conducting surveys in favorable weather conditions prevents distortions caused by wind, heat, or atmospheric changes.
iv. Using tripods and stabilizers for measuring instruments ensures stability and reduces errors caused by ground vibrations or uneven terrain.
v. Avoiding areas with strong magnetic fields or using modern electronic theodolites can help eliminate errors caused by magnetic disturbances.

2. A quality Geography research study depends on a well and elaborative research proposal. In six points, explain the rationale for the quality research proposal in producing reliable research output.

i. A quality research proposal clearly defines the objectives of the study, ensuring that the research remains focused and relevant to the intended purpose.
ii. It provides a structured methodology, outlining how data will be collected and analyzed, ensuring consistency and reliability of findings.
iii. A well-prepared proposal helps in proper resource planning, allowing researchers to allocate time, budget, and manpower efficiently.
iv. It identifies potential challenges and mitigation measures, ensuring that obstacles encountered during research do not compromise the quality of results.
v. A good proposal follows scientific and ethical standards, ensuring credibility and acceptance in the academic or professional field.
vi. It allows for peer review and expert feedback before conducting the actual research, helping refine the study and improve the reliability of the research output.

3. Study carefully the map extract of Mto wa Mbu (sheet 53/4) provided and answer the following questions:

(a) Using two evidences, propose the type of climate of the mapped area.

i. The presence of rivers and swamps in the mapped area suggests a humid or semi-arid climate, where water bodies are present but may not be abundant.
ii. The existence of vegetation cover and agricultural activities indicates moderate to high rainfall levels, supporting plant growth and farming.

(b) With relevant examples, describe two relief features that are found on the map.

i. Hills and ridges are evident on the map, represented by closely spaced contour lines that indicate elevated landforms. These features affect drainage and settlement patterns.
ii. Floodplains and valleys are present, shown by widely spaced contour lines and the presence of river courses, indicating low-lying areas subject to seasonal flooding.

(c) Describe the site and three functions of Mto wa Mbu township.

i. Mto wa Mbu is located in a valley near major water sources, making it a suitable location for human settlement and agriculture.
ii. It serves as a trade center, where local farmers sell agricultural produce and goods, contributing to the economy of the region.
iii. The town supports tourism, being close to national parks and wildlife reserves, attracting visitors and boosting the hospitality industry.
iv. It functions as a transport hub, with roads and infrastructure connecting it to neighboring towns and cities.

(d) Assume the Magnetic Variation (MV) of Mto wa Mbu as at July 2018 was 120° 36' W and its True Bearing (TB) was 180° 44'. If there was annual change of 4' positively, Calculate:

(i) Magnetic Bearing as at January 2022

The total time from July 2018 to January 2022 is 3 years and 6 months, which is 3.5 years.
Total change in magnetic variation = 3.5 years × 4' per year = 14'
New Magnetic Bearing = 120° 36' + 14' = 120° 50' W

(ii) Magnetic Variation as at January 2022
Magnetic Variation = 180° 44' - 120° 50' = 59° 54'

This means that by January 2022, the magnetic variation had increased by 14', leading to a total variation of 59° 54'.

4. You have been invited to a workshop organized by farmers whose harvests have been decreasing in quantity and quality over the years due to soil degradation. In six points, advise them on how they can improve both quality and quantity of their harvests.

To address declining harvests resulting from soil degradation, farmers can implement the following strategies:

Implement Crop Rotation: Alternating different crops in successive planting seasons helps prevent nutrient depletion and disrupts pest and disease cycles. For example, rotating legumes like beans or groundnuts with cereals such as maize can naturally replenish soil nitrogen levels, enhancing soil fertility and improving crop yields.

Adopt Conservation Tillage Practices: Reducing the frequency and intensity of soil tillage helps maintain soil structure, reduce erosion, and preserve organic matter. Techniques such as no-till or minimum-till farming involve planting crops with minimal soil disturbance, which enhances water retention and promotes beneficial microbial activity, leading to healthier soils and better crop performance.

Incorporate Organic Amendments: Adding organic materials like compost, manure, or green manure crops enriches the soil with essential nutrients and improves its physical properties. These amendments increase soil organic matter content, enhance moisture retention, and support a thriving soil ecosystem, resulting in increased crop productivity.

Utilize Cover Crops: Planting cover crops during fallow periods protects the soil from erosion, suppresses weed growth, and enhances soil fertility. Species such as clover, vetch, or rye can fix atmospheric nitrogen, add organic matter, and improve soil structure, thereby boosting the quality and quantity of subsequent harvests.

Implement Agroforestry Systems: Integrating trees and shrubs into farming systems provides multiple benefits, including improved soil fertility, reduced erosion, and diversified income sources. Deep-rooted trees can access nutrients from deeper soil layers, while their leaf litter adds organic matter to the surface soil, enhancing overall soil health and crop yields.

Apply Balanced Fertilization: Conducting soil tests to determine nutrient deficiencies allows for the precise application of fertilizers. Using the appropriate type and amount of fertilizers replenishes depleted nutrients, promoting optimal plant growth and increasing harvest quality and quantity.

5. In three points, classify global wind systems and assess the effects of wind and ocean currents on the aspects of rainfall and temperature. Give two points in each aspect.

Classification of Global Wind Systems:

Global wind systems are large-scale atmospheric circulations that distribute heat and moisture around the Earth. They are primarily classified into:

Trade Winds: These are steady winds that flow from the subtropical high-pressure areas towards the equatorial low-pressure zone. In the Northern Hemisphere, they blow from the northeast, while in the Southern Hemisphere, they blow from the southeast.

Westerlies: Prevailing winds that blow from the west towards the east between 30° and 60° latitude in both hemispheres. They are responsible for much of the weather patterns in the mid-latitudes.

Polar Easterlies: Cold winds blowing from the polar high-pressure areas towards the subpolar low-pressure areas, moving from east to west between 60° and 90° latitudes.

Effects on Rainfall:

Wind Currents: Trade winds can carry moist air from oceans to continents, leading to precipitation in coastal regions. Conversely, when these winds descend over land, they can create arid conditions, as seen in deserts like the Sahara.

Ocean Currents: Warm ocean currents, such as the Gulf Stream, increase evaporation rates, contributing to higher humidity and rainfall in adjacent coastal areas. In contrast, cold currents like the California Current can lead to dry conditions by stabilizing the atmosphere and reducing cloud formation.

Effects on Temperature:

Wind Currents: Westerlies can transport warm air masses from the tropics towards higher latitudes, moderating temperatures in regions like Western Europe. Polar easterlies bring cold air from polar regions to lower latitudes, leading to cooler temperatures in areas like Siberia.

Ocean Currents: Warm currents elevate temperatures of nearby coastal regions, as observed along the southeastern coast of the United States. Cold currents, such as the Benguela Current off the coast of Namibia, can lower coastal temperatures, contributing to cooler and drier climates.

6. You are invited by villagers from Lwandai Village in Lushoto District who wonder why mud flows from the mountains to their settlements. In six points, educate them on the causes of the situation.

Mudflows, or rapid movements of water-saturated soil and debris, can be attributed to several factors:

Intense and Prolonged Rainfall: Heavy rains saturate the soil, reducing its cohesion and triggering mudflows. In regions like Lushoto District, periods of intense rainfall can lead to such events.

Deforestation and Vegetation Loss: Removing trees and vegetation destabilizes the soil, as roots that once held the soil in place are no longer present. This increases susceptibility to erosion and mudflows, especially on steep slopes.

Steep Topography: The mountainous terrain of Lushoto District, characterized by steep slopes, facilitates the downward movement of saturated soil and debris under the influence of gravity.

Poor Agricultural Practices: Farming methods that disturb the soil structure, such as overgrazing or improper tillage, can degrade soil integrity. In Lushoto, such practices have been linked to increased erosion and mudflows.

Soil Composition: Soils with high clay content can absorb significant amounts of water, becoming heavy and prone to flow. The specific soil types in Lushoto may contribute to the frequency of mudflows.

Road Construction and Infrastructure Development: Unplanned or poorly designed roads and infrastructure can alter natural drainage patterns, leading to water accumulation and increased risk of mudflows. In Lushoto, such developments have been associated with landslide occurrences.

7. The nature of the rock and the relief structures of the earth determine the development of river patterns. In six points, justify this statement with the aid of diagrams.

The formation and configuration of river drainage patterns are profoundly influenced by the underlying geology and topographical features of a region. Various combinations of rock types and structural formations give rise to distinct drainage patterns, each reflecting the geological characteristics of the area.

In regions where the underlying rock is homogeneous and uniformly resistant to erosion, such as massive sandstone or granite formations, a dendritic drainage pattern often develops. This pattern resembles the branching of a tree, with tributaries joining larger streams at various angles, creating a network without a dominant direction. The lack of structural controls allows rivers and their tributaries to flow freely, forming this random branching network. This pattern is common in areas with gentle slopes and consistent rock types.

In contrast, areas characterized by alternating bands of resistant and less resistant rock strata, often due to folding, exhibit a trellis drainage pattern. Here, primary streams cut through ridges composed of harder rock and are fed by tributaries that run parallel to each other along the valleys of softer rock. This arrangement resembles a garden trellis and is indicative of regions with pronounced structural control, such as the Appalachian Mountains in the United States.

A rectangular drainage pattern emerges in terrains where the bedrock is intersected by joints or faults at right angles. Streams exploit these lines of weakness, resulting in a network of channels that meet predominantly at 90-degree angles. This pattern is typical in areas with well-defined fault lines or fractured bedrock, guiding the direction of stream flow.

When rivers originate from a central elevated point, such as a volcanic cone or dome, they often display a radial drainage pattern. Streams radiate outward from the peak, descending the slopes in all directions. This pattern indicates a topographical high point from which water flows away, as seen around volcanic mountains like Mount Kilimanjaro in Tanzania.

Conversely, a centripetal drainage pattern occurs when streams converge toward a central low point, such as a basin or depression. This pattern is common in regions where the topography directs water inward, often leading to the formation of lakes or wetlands in the central area.

An annular drainage pattern is characterized by concentric streams that form on eroded structural domes or basins with alternating layers of hard and soft rock. Erosion exposes these layers, and streams develop circular paths along the less resistant rocks, creating a ring-like drainage network. This pattern reflects the underlying geological structure of the area.

Understanding these drainage patterns provides insights into the geological history and structural composition of a region, as the interaction between rock types and relief directly influences the development and orientation of river systems.