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: 2009**

Instructions

1. This paper consists of section A, and B with total of 13 questions.
2. Answer 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 MPWAPWA, sheet 163/4 then answer the questions that follow.

(a) Calculate the area covered by forest in square kilometres.

To calculate the area covered by forest, we use the map scale provided and identify the forested regions. The method involves:
- Identifying the forested areas marked on the map.
- Using grid squares to estimate the area. Each grid square represents a certain area based on the map scale.
- Counting the fully occupied squares and estimating partially occupied ones.
- Summing up the total estimated area.

Without precise measurements from the map, the calculation cannot be done accurately here, but the process follows this principle.

(b) Calculate the gradient from the Bridge Grid Ref. 109898 to Chamsimba Hill Grid Ref. 180955.

The gradient is calculated using the formula:

Gradient = Vertical height difference / Horizontal distance

Steps:
1. Determine the contour heights at both locations from the map.
2. Subtract to find the vertical difference.
3. Measure the horizontal distance using the scale.
4. Divide the height difference by the horizontal distance.

Without the exact contour values and measurements from the map, the numerical answer cannot be determined, but this is the correct procedure.

(c) By using a sketch map describe the nature of relief and drainage of the mapped area.

The relief describes the variation in elevation, including hills, valleys, and plains. The map shows contour lines indicating areas of high and low elevation. Steep slopes are represented by closely spaced contour lines, while gentle slopes have widely spaced contours. The drainage system includes rivers, streams, and possibly lakes, which flow according to the terrain. A sketch map should highlight these features with key elevations, river courses, and major landforms.

(d) What factors have influenced the distribution of vegetation in the area?

Several factors influence vegetation distribution, including:
- Climate: Rainfall and temperature affect vegetation density. High rainfall areas support forests, while drier regions have shrubs and grasses.
- Soil type: Fertile soils support dense vegetation, while rocky or sandy soils limit growth.

- Topography: Steep slopes may have sparse vegetation due to erosion, while valleys can support lush growth.
- Human activities: Deforestation, agriculture, and settlement affect vegetation patterns.
- Drainage: Areas near rivers and water bodies have more vegetation due to water availability.

(e) With evidence, comment on the economic activities of the area.

Based on the map features, economic activities likely include:
- Agriculture: Presence of settlements and open lands suggest farming.
- Livestock keeping: Grasslands indicate grazing areas.
- Trade and transport: Roads and tracks suggest movement of goods and people.
- Mining: If quarries or mineral deposits are marked, mining may be present.
- Forestry: Presence of forested areas suggests timber or firewood extraction.

(f) Examine the climatic conditions of the area.

Climatic conditions depend on:
- Rainfall: The type of vegetation and river flow patterns suggest the amount of rainfall.
- Temperature: Elevation affects temperatures, with higher altitudes being cooler.
- Winds: The presence of windbreaks or sand dunes may indicate strong winds.
- Seasonality: Rivers and vegetation types can suggest wet and dry seasons.

(g) Assess the nature of transport system of the area, shown on the map.

The transport system can be assessed by examining:
- Road types: Presence of tarmac, gravel, or dirt roads indicates accessibility.
- Railways: If a railway is present, it suggests major transport links.
- Bridges: Indicate river crossings and connectivity.
- Settlement patterns: Towns and villages near roads suggest reliance on road transport.

2. Study carefully the following data and answer the questions that follow.

Class Interval	Frequency
0 - 4	2
5 - 9	11
10 - 14	37
15 - 19	54
20 - 24	28
25 - 29	9
30 - 34	1
35 - 39	3

(a) Find the range of grouped data.

Range = Highest value - Lowest value

Highest value in the last class interval = 39
Lowest value in the first class interval = 0
Range = 39 - 0 = 39

(b) Calculate the standard deviation.
The standard deviation for grouped data is calculated using:

1. Find the midpoint for each class interval.
2. Multiply the midpoint by the frequency to find the mean.
3. Use the variance formula:

Variance = $\Sigma(f\,(x - \text{mean})^2) / \Sigma\, f$
Standard deviation = $\sqrt{\text{Variance}}$

The calculated standard deviation of the given grouped data is approximately 6.16.
(c) What are the advantages and disadvantages of range in a given geographical data?

Advantages:
- Easy to calculate: The range requires only the highest and lowest values, making it simple to determine.
- Gives an idea of data spread: It provides a quick measure of the variability in geographical data, such as temperature differences or elevation ranges.
- Useful in comparative analysis: Helps in comparing different regions by showing differences in climatic conditions or landforms.

Disadvantages:
- Ignores data distribution: It does not consider how data is spread between the highest and lowest values.
- Sensitive to outliers: Extreme values can distort the range, making it misleading.
- Does not provide detailed variability: It does not indicate patterns within the data, such as clustering or dispersion trends.

3. Using figure 1 below, describe how you would adjust the misclosure (error).

Misclosure occurs when the measured perimeter does not close properly due to errors in measurements or calculations. To adjust misclosure:
- Identify the total misclosure by summing up the discrepancies in distance or angles.
- Use the Bowditch method (compass rule) if the error is proportional to the lengths of the lines, distributing the error equally among all measured values.
- If the misclosure is due to an angular error, apply the equal angle adjustment method, distributing the error among all angles.
- Recalculate adjusted distances and angles, ensuring that the perimeter closes accurately.

4.

(a) Differentiate aerial photographs from ground photographs.

Aerial photographs are taken from an elevated position, usually from an aircraft, drone, or satellite, while ground photographs are captured from the Earth's surface. The key differences include:
- Perspective: Aerial photographs provide a bird's-eye view, covering a larger area, whereas ground photographs show a horizontal or oblique perspective.
- Coverage: Aerial images can capture vast landscapes, while ground photographs focus on specific objects or limited areas.
- Distortion: Aerial photographs may have distortions due to altitude and camera angle, while ground photos usually have fewer distortions.
- Application: Aerial images are used in cartography, remote sensing, and geographic studies, while ground photos are common in personal, media, and detailed studies.

(b) Calculate the height of an area shot by a camera whose focal length is 132 mm, mounted on an aircraft which is flying at 10,500 m above the sea level. Suggested scale is 1:25,000.

Using the formula:

Height of object = Aircraft altitude - (Focal length * Scale denominator)

Substituting the values:

Height = 10,500 m - (132 mm * 25,000)

Since 132 mm = 0.132 m,

Height = 10,500 m - (0.132 * 25,000)

Height = 10,500 m - 3,300 m

Height = 7,200 m

So, the height of the area shot by the camera is 7,200 meters.

5.

(a) Explain the stages employed in constructing dot maps.

Dot maps are created in the following stages:
- Data collection: Gather numerical data on the distribution of a variable such as population or rainfall.
- Selection of scale: Choose an appropriate dot value, for example, one dot representing 1,000 people.

- Base map preparation: A geographical outline is drawn to provide spatial reference.
- Dot placement: Dots are positioned on the map based on the density of the variable being represented.
- Cartographic refinement: Ensure the final map is clear, avoiding over-clustering or misrepresentation.

(b) What are the shortcomings of dot maps?

Dot maps have several limitations:
- Difficult interpretation: High dot density can make it hard to distinguish individual dots.
- Generalization errors: Dots may not be placed exactly where the phenomenon occurs, leading to misrepresentation.
- Scale limitations: Choosing the wrong dot value can either oversimplify or overcomplicate the representation.
- Data dependency: Requires accurate and detailed numerical data, which may not always be available.

SECTION B (48 marks)

Answer three questions from this section.

6. "Plate tectonic theory is a new version of continental drift theory". Elaborate.

The plate tectonic theory builds upon and refines the continental drift theory. Continental drift, proposed by Alfred Wegener, suggested that continents move over time, but it lacked a mechanism for movement. Plate tectonics explains this movement by describing how Earth's lithosphere is divided into plates that float on the semi-fluid asthenosphere. The theory includes:
- Seafloor spreading: Explains new crust formation at mid-ocean ridges.
- Subduction zones: Describes how plates sink into the mantle, recycling crust.
- Transform faults: Justifies lateral plate movements, explaining earthquakes.
- Paleomagnetic evidence: Supports the theory through magnetic patterns in oceanic crust.

Thus, plate tectonics is a more comprehensive and scientifically backed version of continental drift theory.

7. Describe the surface temperature and wind-driven circulation in oceans.

Surface temperature in oceans varies due to:
- Latitude: Higher latitudes have colder waters due to less solar radiation.
- Ocean currents: Warm currents such as the Gulf Stream raise temperatures, while cold currents such as the Benguela Current lower them.
- Seasonal variations: Summer increases temperatures, while winter lowers them.

Wind-driven circulation in oceans is influenced by:
- Trade winds: Move surface waters westward in the tropics.
- Coriolis effect: Causes deflection of currents, creating gyres.

- Upwelling and downwelling: Wind patterns bring deep, nutrient-rich waters to the surface, affecting marine ecosystems.
- Ocean-atmosphere interaction: El Niño and La Niña disrupt normal wind-driven circulation, affecting global climate.

8. Examine how the following wind depositional features are formed in a desert landscape.

(a) Barchans
Barchans are crescent-shaped dunes formed by constant wind blowing from one direction. The wind carries sand and deposits it in curved mounds, with the concave side facing the wind.

(b) Longitudinal dunes
Longitudinal dunes are elongated ridges of sand parallel to the prevailing wind direction. They form when winds blow in two slightly different directions, causing sand accumulation in long strips.

(c) Transverse dunes
Transverse dunes are wavy ridges of sand perpendicular to wind direction. They form in areas with abundant sand and strong, consistent winds.

9. Examine the factors which are important in assessing soil fertility.

Soil fertility is assessed based on:
- Nutrient content: High levels of nitrogen, phosphorus, and potassium indicate fertile soil.
- Organic matter: Decomposed plant and animal materials improve soil structure and nutrient availability.
- Soil pH: A neutral to slightly acidic pH is optimal for most crops.
- Moisture retention: Well-structured soils retain enough water for plant growth.
- Microbial activity: Beneficial bacteria and fungi enhance nutrient cycling.
- Texture and structure: Loamy soils with good aeration are generally more fertile.

10. The present coastline definitely differs greatly from that of the last century. Give supporting evidence to prove the validity of the above statement.

Evidence includes:
- Sea level rise: Due to climate change, many coastlines have submerged.
- Coastal erosion: Wave action and human activities have altered shorelines.
- Deposition of sediments: River and ocean currents continuously reshape coasts.
- Urban expansion: Coastal cities have expanded, modifying the landscape.
- Glacial melting: Increased freshwater input has changed coastal ecosystems.

11. Describe the following terms.

(a) Air mass

An air mass is a large body of air with uniform temperature, humidity, and pressure characteristics. It forms over specific regions and influences weather patterns when it moves.

(b) Temperature inversion
Temperature inversion occurs when a layer of warm air traps cooler air below it, preventing normal heat transfer. This leads to smog accumulation and temperature stability in valleys.

(c) Advection fog
Advection fog forms when warm, moist air moves over a cooler surface, causing condensation. It is common in coastal areas where warm ocean air encounters cold land.

(d) Katabatic wind

Katabatic winds are cold, dense winds that flow downhill from high elevations to lower areas due to gravity. They form when air near the ground cools rapidly, becoming denser and heavier than the surrounding air. This denser air then moves downslope under the influence of gravity. Katabatic winds are common in mountainous and glaciated regions, especially in Antarctica and Greenland. They can also occur in smaller scales in valleys at night when the air cools and sinks. These winds can be strong and dry, significantly affecting local climates and weather patterns.

12. Examine the formation of lakes in a glaciated region.

Lakes in glaciated regions form through several processes, including:

- Glacial erosion. As glaciers move, they erode the landscape by plucking and abrasion. This creates depressions that later fill with meltwater, forming lakes. Examples include cirque lakes, which develop in bowl-shaped hollows on mountain slopes.

- Glacial deposition. As glaciers retreat, they leave behind moraines, which can block valleys and create natural dams. Water accumulates behind these deposits, forming lakes known as moraine-dammed lakes.

- Isostatic depression. The weight of glaciers depresses the Earth's crust. When the glaciers melt, the land slowly rebounds, creating depressions that may fill with water, forming lakes. An example is the Great Lakes in North America.

- Kettle lakes. These form when blocks of ice are buried in glacial debris and later melt, leaving behind small, water-filled depressions.

- Tarn lakes. These occur when glacial erosion deepens a cirque, which later fills with water after the glacier melts.

- Eskers and outwash plains. Water from melting glaciers can form lakes in outwash plains where sediments block drainage.

13. "Variation in river volume is an inevitable circumstance". Discuss.

River volume varies due to several natural and human-induced factors. These variations are inevitable because they result from complex interactions between climatic, geological, and anthropogenic influences.

- Seasonal variations. In many regions, river volume fluctuates with seasonal changes. During rainy seasons, rivers receive more water from precipitation, while in dry seasons, flow decreases. Monsoonal rivers, for example, experience drastic volume changes due to seasonal rainfall.

- Glacial melt. In areas with glaciers, river volume increases during warmer months when ice melts and decreases during colder months. This is common in high-altitude rivers such as the Ganges, which relies on Himalayan glaciers.

- Rainfall patterns. The amount and distribution of rainfall affect river volume. Regions experiencing heavy rainfall see increased river discharge, while drought-prone areas experience reduced flow.

- Evaporation and infiltration. High temperatures increase evaporation, reducing river volume. Similarly, porous soils and permeable rocks allow more water to seep into the ground, decreasing surface flow.

- Human activities. Dams, reservoirs, and irrigation schemes regulate river flow, sometimes reducing natural variations. However, deforestation and land use changes can increase runoff, leading to sudden river volume increases during storms.

- Tectonic activities. Earthquakes, volcanic eruptions, and land subsidence can alter river courses, affecting their volume. Some rivers may disappear or change direction due to tectonic shifts.

Given these factors, river volume variation is unavoidable and results from a combination of natural and human influences. While some variations follow predictable seasonal patterns, others occur due to sudden environmental changes or human interventions.