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: 2020**

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.

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1. Study carefully the map extract of Kimamba (sheet 182/73) provided and answer the following questions.

(a) Calculate the area covered by Sisal Estate in kilometer squares.

i. Identify the region marked as Sisal Estate on the map.
ii. Count the number of full grid squares occupied by the estate. Each full grid square on a 1:50000 scale map represents 1 square kilometer.
iii. Count partially occupied squares and estimate their total in terms of full squares.
iv. Summing up these values, the area covered by Sisal Estate is approximately 9 square kilometers.

(b) With concrete reasons, suggest the type of climate of the area.
i. The presence of sisal plantations indicates a semi-arid or tropical savanna climate, as sisal grows well in areas with moderate rainfall and dry seasons.
ii. The existence of scattered vegetation and thorny bushes suggests limited rainfall and prolonged dry conditions.
iii. The presence of seasonal swamps and rivers shows that water sources rely on seasonal rainfall rather than year-round precipitation.

(c) Find forward and back bearing of Mbwende grid reference 880395 to Tindiga school grid reference 910405.

i. Draw a straight line from Mbwende (880395) to Tindiga school (910405) on the map.
ii. Measure the angle between the north line and the direction towards Tindiga school using a protractor.
iii. The measured forward bearing is approximately 75°.
iv. The back bearing is found by adding 180° if the forward bearing is less than 180°, or subtracting 180° if the forward bearing is greater than 180°.
v. The back bearing = 75° + 180° = 255°.
(d) Explain three factors which have influenced population distribution in the area.

i. Availability of agricultural land has influenced settlement, as people are concentrated around fertile areas like the Sisal Estate, where farming activities provide employment.
ii. Presence of transport networks such as roads and railway lines facilitates movement of people and goods, attracting settlements along these routes.
iii. Water sources such as rivers and swamps determine settlement patterns, as people tend to settle in areas where water is available for domestic and agricultural use.

(e) Describe the type of drainage patterns shown on the map.
i. The map displays a dendritic drainage pattern, characterized by a tree-like branching of rivers and streams. This pattern forms in areas with uniform rock structures and gentle slopes.
ii. There are also signs of seasonal drainage where rivers flow only during rainy seasons, as indicated by the presence of seasonal swamps.
iii. Some areas show parallel drainage, where rivers run in nearly straight lines due to structural control by the terrain.

(f) Which part of the map is covered by highlands? Give two reasons for your answer.
i. The western part of the map is covered by highlands, as evidenced by closely spaced contour lines indicating steep slopes and elevated terrain.
ii. The presence of steep slopes and escarpments confirms that the region has a highland landscape, influencing settlement and land use patterns.

2. (a) Describe four types of sampling techniques.
Sampling techniques are essential methodologies in research, enabling the selection of representative subsets from larger populations for study. Four primary sampling methods include simple random sampling, systematic sampling, stratified sampling, and cluster sampling.

Simple random sampling ensures that every individual in a population has an equal chance of being selected. This can be achieved by assigning numbers to each member and using random number generators to pick participants. For example, in a study of 1,000 employees, each employee could be assigned a number from 1 to 1,000, and a random selection of these numbers would determine the sample group.

Systematic sampling involves selecting subjects at regular intervals from an ordered list. After choosing a random starting point, every nth individual is selected. For instance, if a researcher has a list of 500 students and decides on a sampling interval of 5, they might start at the 3rd student and then select every 5th student thereafter (i.e., 3rd, 8th, 13th, etc.).

Stratified sampling divides the population into distinct subgroups, or strata, based on specific characteristics such as age, gender, or income level. Random samples are then drawn from each stratum proportional to its size in the population. For example, if a population consists of 60% females and 40% males, a stratified sample of 100 individuals would include 60 females and 40 males, ensuring representation of both groups.

Cluster sampling entails dividing the population into clusters, often based on geographical areas or institutions, and then randomly selecting entire clusters for study. All individuals within chosen clusters are included in the sample. For example, a researcher studying educational methods might randomly select 10 schools (clusters) and include all teachers from those schools in the sample.
(b) Outline four importance of sampling.
Sampling serves as a cornerstone in research for several reasons:
1. Cost and Time Efficiency: Studying an entire population can be resource-intensive and time-consuming. Sampling allows researchers to gather and analyze data more quickly and with reduced costs.
2. Manageability: Handling a smaller, representative sample simplifies data collection and analysis, making the research process more practical and less cumbersome.
3. Accuracy and Precision: Properly designed sampling methods can yield results that closely mirror those of a full population study, ensuring reliable and valid conclusions.
4. Feasibility: In cases where studying the whole population is impossible—such as when the act of studying could destroy the subject (e.g., crash testing vehicles)—sampling provides a viable alternative.
3. You have been appointed to become a group leader in conducting a plane table survey. Clearly show the equipment to be used and procedures you would follow so as to complete your work successfully.

As the group leader for a plane table survey, it's essential to ensure that all necessary equipment is available and that the team follows systematic procedures to achieve accurate results.

Equipment:
The primary tools required for a plane table survey include:
Plane Table: A flat, smooth board mounted on a tripod, serving as the drawing surface.
Alidade: A straightedge with sighting devices used to establish lines of sight and measure angles.
Tripod: A three-legged stand providing stable support for the plane table.
Spirit Level: An instrument used to ensure the plane table is perfectly horizontal.
Plumb Bob and Plumb Fork (U-frame): Tools used for centering the plane table over a specific ground point.

Compass: For determining magnetic bearings and aiding in orientation.
Drawing Paper and Clips: Paper affixed to the plane table for plotting, secured with clips or screws.
Ranging Rods: Poles positioned at specific points to assist in sighting and alignment.
Measuring Tape or Chain: For measuring distances between points.

Procedures:
1. Setting Up the Plane Table:
Fixing: Mount the plane table securely on the tripod.
Leveling: Use the spirit level to ensure the table surface is horizontal. Adjust the tripod legs as necessary.
Centering: Position the table so that the point on the drawing paper corresponds vertically above the ground point, using the plumb bob and plumb fork for precision.

2. Orientation:
Align the plane table so that the plotted lines on the paper are parallel to the corresponding lines on the ground. This can be achieved using a compass to match magnetic bearings or by back-sighting to a known point.

3. Plotting Points:
Place the alidade on the paper, sighting towards the target point.
Draw a ray along the alidade's edge towards the point.
Measure the distance to the point using the tape or chain and scale it appropriately on the drawing.
Mark the point on the paper where the scaled distance intersects the ray.

4. Traversing:
Move the plane table to a new station point.
Repeat the centering, leveling, and orientation processes.
Back-sight to previously plotted points to ensure consistency and accuracy.

5. Detailing:Fill in additional features such as boundaries, structures, and natural formations by sighting and measuring from established station points.

4. With support of examples, explain how climate determines human settlements and economic activities. Provide eight points.

Climate plays a pivotal role in shaping human settlements and influencing economic activities across the globe. Favorable climatic conditions often attract populations to establish communities, as seen in the fertile Nile River Valley, where predictable rainfall and moderate temperatures have supported agriculture for millennia. Conversely, harsh climates, such as the extreme cold of Siberia, deter dense human habitation due to challenges in sustaining livelihoods.

Agricultural practices are profoundly affected by climate. For instance, the Mediterranean climate, characterized by wet winters and dry summers, is ideal for cultivating olives and grapes, leading to thriving olive oil and wine industries in regions like Southern Europe. In contrast, arid climates limit crop production, necessitating irrigation or alternative livelihoods.

Climate also dictates architectural designs and housing materials. In tropical regions with high humidity and rainfall, homes are often built on stilts to prevent flooding and promote air circulation, as observed in parts of Southeast Asia. Meanwhile, in areas with cold climates, such as Scandinavia, homes are constructed with steep roofs to prevent snow accumulation and are well-insulated to retain heat.

Economic activities like tourism are climate-dependent. The Caribbean's warm, sunny climate attracts tourists year-round, bolstering local economies. In contrast, regions prone to extreme weather events, such as hurricanes, may experience fluctuations in tourist arrivals, impacting economic stability.

Energy consumption patterns are influenced by climate. In colder regions, there is a higher demand for heating during winter months, leading to increased energy usage. Conversely, hotter climates may see elevated energy consumption due to air conditioning needs, as experienced in the Middle East.

Transportation infrastructure is designed with climate considerations. In areas susceptible to heavy snowfall, such as Canada, roads and railways are constructed to withstand snow and ice, and snow removal systems are integral to maintaining accessibility. In contrast, regions with high rainfall require effective drainage systems to prevent flooding of transport networks.

Health outcomes are linked to climate, influencing settlement patterns. Tropical climates with high humidity can foster the spread of vector-borne diseases like malaria, prompting public health interventions and sometimes discouraging settlement in heavily affected areas. Alternatively, temperate climates may have lower incidences of such diseases, making them more attractive for habitation.

Lastly, climate impacts water resource availability, crucial for both settlements and economic activities. The monsoon-dependent regions of South Asia rely on seasonal rainfall for agriculture and daily water needs. Variations in monsoon patterns can lead to droughts or floods, directly affecting food security and livelihoods.

5. “The Earth is said to be spherical in nature.” With the aid of diagrams, justify this statement by using six points.

The spherical nature of Earth is evidenced through various observations and phenomena.

One compelling proof is the appearance of ships on the horizon. As a ship approaches from the sea, the top of the mast becomes visible before the hull, suggesting a curved surface. If Earth were flat, the entire ship would be seen simultaneously.

The curved shadow of Earth on the Moon during a lunar eclipse further supports its sphericity. When Earth passes between the Sun and the Moon, it casts a round shadow on the Moon's surface, indicating a spherical shape.

Variations in star constellations with latitude also demonstrate Earth's curvature. Travelers moving north or south observe changes in visible star patterns; certain constellations disappear below the horizon while new ones emerge, a phenomenon consistent with a spherical Earth.

The difference in time zones across longitudes is another indicator. As Earth rotates, different locations experience sunrise and sunset at varying times, which aligns with a spherical planet where only a portion is illuminated by the Sun at any given moment.

Photographs of Earth from space provide direct visual evidence of its round shape. Images captured by satellites and astronauts consistently show a circular Earth, confirming its sphericity.

Finally, the gravitational pull towards Earth's center results in objects experiencing weight uniformly in all directions, a phenomenon best explained by a spherical mass where gravity acts radially inward.

6. With relevant examples, classify six types of lakes according to their mode of formation.

Lakes are natural or artificial bodies of water that occupy inland basins and are formed through various geological and climatic processes. Understanding the modes of lake formation provides insight into Earth's dynamic landscape. Here are six types of lakes classified by their formation:

Tectonic Lakes are formed by movements of the Earth's crust, such as faulting, warping, or rifting, which create depressions that fill with water. For example, Lake Baikal in Russia, the world's deepest freshwater lake, occupies a rift valley formed by tectonic forces. Similarly, the Caspian Sea, located between Europe and Asia, is a remnant of ancient tectonic activity that created its basin.

Volcanic Lakes develop in depressions created by volcanic activity. When a volcano erupts and then collapses, it can form a caldera that fills with water, resulting in a lake. Crater Lake in Oregon, USA, exemplifies this, filling a caldera formed by the collapse of Mount Mazama around 7,700 years ago. Another example is Lake Toba in Indonesia, which occupies a caldera from a supervolcanic eruption approximately 74,000 years ago.

Glacial Lakes are created by the action of glaciers, which carve out depressions in the landscape that later fill with meltwater. The Great Lakes of North America, including Lake Superior, were formed through glacial processes during the last Ice Age. In Europe, Lake Geneva straddles the border between France and Switzerland and was also formed by glacial activity.

Fluvial Lakes, also known as oxbow lakes, originate from the meandering of rivers. Over time, a river may create a wide meander that becomes cut off from the main channel, leaving behind a crescent-shaped lake. Carter Lake in Iowa, USA, is an example of an oxbow lake formed from the Missouri River. Similarly, Lake Chicot in Arkansas was formed from a former channel of the Mississippi River.

Landslide Lakes occur when landslides, mudflows, or rockfalls block a river valley, creating a natural dam that impounds water. For instance, Quake Lake in Montana, USA, was formed in 1959 after a massive earthquake-triggered landslide blocked the Madison River. In Tajikistan, Sarez Lake was created in 1911 when a landslide, triggered by an earthquake, dammed the Murghab River.

Aeolian Lakes are formed by wind action, typically in arid regions where wind-blown sand creates depressions that can fill with water. Moses Lake in Washington, USA, is an example, originally a shallow natural lake that expanded due to wind-deposited sand dunes acting as natural dams. In China's Badain Jaran Desert, numerous small lakes exist between sand dunes, formed by similar aeolian processes.

These diverse lake types illustrate the dynamic interplay of geological and climatic forces shaping Earth's surface, resulting in varied aquatic environments across the globe.

7. Explain how parent rock, climate, and living organisms influence soil formation. Provide three points for each.

Soil formation, or pedogenesis, is a complex process influenced by various factors, including parent rock, climate, and living organisms. Each of these elements plays a crucial role in determining the characteristics and fertility of the resulting soil.

Parent Rock:

The parent rock, or parent material, serves as the foundational substrate from which soils develop. Its mineral composition directly affects the soil's texture, structure, and nutrient content. For instance, soils derived from limestone are typically rich in calcium, fostering fertile conditions favorable for agriculture. In contrast, soils originating from quartz-rich sandstone may be sandy and low in nutrients, posing challenges for plant growth. The rate at which parent rock weathers also influences soil formation; softer rocks like shale break down more rapidly, leading to quicker soil development, whereas harder rocks such as granite weather slowly, resulting in more gradual soil formation. Additionally, the color of the parent rock can impart hues to the soil; for example, iron-rich basalt can produce reddish soils due to iron oxidation.

Climate:

Climate exerts a significant impact on soil formation through temperature and precipitation patterns. In regions with high rainfall, increased water infiltration accelerates the leaching of soluble minerals from the soil, which can lead to nutrient deficiencies in areas like the Amazon rainforest. Conversely, arid climates with minimal precipitation often result in limited leaching, causing salts to accumulate and potentially leading to saline soils, as observed in parts of the Sahara Desert. Temperature influences the rate of chemical weathering; warmer climates enhance chemical reactions that break down minerals, promoting faster soil development, while colder regions experience slower weathering processes, leading to thinner soils.

Living Organisms:

Biological activity from plants, animals, and microorganisms profoundly shapes soil characteristics. Plant roots penetrate rock fractures, facilitating physical weathering and the breakdown of parent material. As plants shed leaves and other organic matter, decomposition by soil microorganisms enriches the soil with humus, enhancing fertility and water retention. For example, prairies with abundant grasses contribute substantial organic matter to the soil, resulting in the rich, dark soils of the North American Midwest. Soil fauna, such as earthworms, further influence soil formation by burrowing and mixing organic and mineral components, improving aeration and nutrient distribution. In tropical rainforests, the rapid decomposition of organic matter due to high microbial activity leads to the swift recycling of nutrients, maintaining soil fertility despite heavy rainfall that might otherwise leach nutrients away.

Understanding the interplay of parent rock, climate, and living organisms is essential for effective soil management and conservation, as these factors collectively determine soil health and productivity.