Subject: Physics

Form/Grade: Form 1

Official Syllabus Topic: Geophysics

Curriculum: Zambia Competency-Based Curriculum (CBC)

SECTION 1: Topic Overview

The purpose of Geophysics is to introduce learners to the physical structure and processes of the Earth, including its atmosphere, magnetic field, seismic activity, and gravitational effects, fostering an understanding of how physical principles apply to planetary phenomena and environmental sustainability in Zambia.

SECTION 2: Scenario-Based Learning Examples (EXACTLY FIVE)

Scenario 1:

Context: In the seismically active areas near Lake Tanganyika in Northern Zambia, learners discuss historical earthquakes and their impacts on local communities, using maps of fault lines in the East African Rift Valley that extends into Zambia.

Learner Engagement: Groups construct simple models of tectonic plates using cardboard and clay to simulate plate movements and earthquake generation, analyzing wave propagation

through different materials, then present findings on safety measures for Zambian buildings in rift zones.

Competency Developed (Analytical Thinking - Compile data, create mental images and address issues): Learners compile seismic data and visualize solutions for earthquake preparedness.

Scenario 2:

Context: During the rainy season in Lusaka, Zambia, learners observe weather patterns and atmospheric pressure changes that influence flooding in low-lying areas like Kanyama compound.

Learner Engagement: Collaborate to build barometers from bottles and straws, measuring pressure variations over days, then discuss in pairs how atmospheric layers protect Zambia from solar radiation while contributing to seasonal rains essential for agriculture.

Competency Developed (Collaboration - Solving puzzle in groups): Learners work in groups to interpret pressure data puzzles.

Scenario 3:

Context: In Kitwe on the Copperbelt, learners explore the Earth's magnetic field using compasses near mining sites, noting how magnetic minerals in copper ores affect readings, linking to Zambia's mining industry.

Learner Engagement: Communicate through sketches and oral reports the structure of Earth's magnetic field, explaining compass navigation used in traditional Zambian hunting and modern mining surveys, seeking peer feedback on accuracy.

Competency Developed (Communication - Use mathematical/scientific language in different situations): Learners express geomagnetic concepts scientifically.

Scenario 4:

Context: Learners in Mansa, Luapula Province, examine soil layers and rock formations exposed by river erosion, classifying them to understand Zambia's geological history and potential for landslides during heavy rains.

Learner Engagement: Manipulate soil samples to compare densities and compositions, arranging them by attributes like permeability, then critically discuss how internal Earth structure influences volcanic risks in nearby rift areas.

Competency Developed (Critical Thinking - Compare similarities or differences between objects): Learners compare geological samples.

Scenario 5:

Context: In rural Southern Province near Choma, learners measure variations in gravity using simple pendulums, noting effects near karst landscapes with underground caves common in Zambian limestone regions.

Learner Engagement: Identify waste from experiments and dispose properly, reflecting on how understanding gravity and Earth structure supports sustainable land use to prevent sinkholes and maintain clean environments in farming communities.

Competency Developed (Environmental Sustainability - Adhere to best practices in environmental management): Learners apply geophysical knowledge to environmental care.

SECTION 3: Effective Teaching Approach

Geophysics should be taught in Form 1 via inquiry-based and collaborative learning in Zambian classrooms with limited ICT resources, using local materials like soil, rocks, water, and strings for models and demonstrations. Start with discussions on observable phenomena such as

earthquakes in the rift valley or seasonal weather, encouraging group experiments and peer teaching. Differentiate tasks by ability, such as simple observations for some and data analysis for others, with reflective feedback sessions linking concepts to Zambian environmental challenges for a learner-centered CBC experience.

SECTION 4: Competency-Based Assessment Ideas

1. Group model of Earth's interior layers using local clays, evaluated on structural accuracy and explanation of heat transfer (Analytical Thinking - Evaluate solutions).

2. Paired activity measuring atmospheric pressure changes, compiling and sharing results collaboratively (Collaboration - Participate in and express themselves through play activities).

3. Presentation on Earth's magnetic field applications in Zambian navigation or mining (Communication - Express oneself using different media and symbols).

4. Classification task sorting rock samples from school grounds by geophysical properties (Critical Thinking - Classify objects according to their attributes).

5. Reflection report on safe disposal after seismic wave simulations, linking to sustainable practices (Environmental Sustainability - Dispose trash in the designated place).

SECTION 5: Extension and Real-Life Application (Zambia-Focused)

Learners can safely collect and examine rock samples from nearby rivers or quarries in their communities, discussing geological stability for safe building sites. At home, monitor weather changes with homemade instruments, applying atmospheric knowledge to predict rains for family farming. Join school clubs to map local magnetic variations using compasses, aiding community navigation or resource exploration. Participate in tree-planting initiatives to prevent soil erosion, understanding how geophysical processes affect land in Zambian provinces. Observe and report minor tremors or floods to authorities, promoting earthquake and flood preparedness in vulnerable areas like the rift zones.