Subject: Physics

Form/Grade: Form 3

Official Syllabus Topic: Static Electricity

Curriculum: Zambia Competency-Based Curriculum (CBC)

SECTION 1: Topic Overview

The purpose of Static Electricity is to enable learners to understand the principles of electrostatics, including charging by rubbing, conductors and insulators, electric fields, charge distribution, lightning, and simple capacitors, developing skills in explaining electrostatic phenomena and their practical implications.

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

Scenario 1:

Context: In the dry season on the Copperbelt in Ndola, Zambia, learners observe dust particles clinging to plastic combs after combing hair or to vehicles after driving on unpaved roads, experiencing common static build-up in Zambia's mining towns.

Learner Engagement: Groups rub various local materials like polythene bags and wool, compile attraction/repulsion data, create mental images of charge transfer, evaluate risks like sparks near fuel, and address prevention methods for safe handling in daily activities.

Competency Developed (Analytical Thinking - Compile data, create mental images and address issues): Learners compile data, create mental images and address issues.

Scenario 2:

Context: During school cultural dances in Chipata, Eastern Province, learners feel hair standing while wearing traditional sisal skirts, collaborating in circles to share observations of static effects in communal Zambian performances.

Learner Engagement: Pairs experiment with charged rods and paper bits, play with inducing charges on neutral objects, solve group puzzles on conductor versus insulator behaviour while building relationships through interactive trials.

Competency Developed (Collaboration - Play with peers to build relationships): Learners play with peers to build relationships.

Scenario 3:

Context: In Lusaka's tailoring workshops like those in Mtendere Market, workers use charged plastic rulers to pick up threads, explaining charge distribution on pointed versus rounded objects in Zambia's garment production settings.

Learner Engagement: Use diagrams and scientific language to communicate electric field lines around charged spheres, express potential differences symbolically, present findings, and seek peer feedback on capacitor applications in local electronics.

Competency Developed (Communication - Use mathematical/scientific language in different situations): Learners use mathematical/scientific language in different situations.

Scenario 4:

Context: Learners in rural Mongu observe lightning storms over the Barotse floodplains, comparing strike patterns on tall trees versus flat ground during rainy seasons common in Western Zambia.

Learner Engagement: Manipulate gold leaf electroscopes to detect charges, arrange objects by conductivity attributes, compare deflection differences to differentiate safe from risky positions during thunderstorms.

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

Scenario 5:

Context: In community farms near Choma, Southern Province, farmers experience shocks from metal fences after dry winds, identifying improper grounding and waste like plastic litter contributing to static hazards in agricultural environments.

Learner Engagement: After charging experiments with Van de Graaff generators or balloons, identify plastic waste, dispose in designated school bins, adhering to practices that reduce fire risks from sparks in rural Zambian settings.

Competency Developed (Environmental Sustainability - Adhere to best practices in environmental management): Learners adhere to best practices in environmental management.

SECTION 3: Effective Teaching Approach

Static Electricity should be taught in Form 3 through hands-on demonstrations and inquiry-based experiments in Zambian classrooms with limited ICT resources, using everyday materials like balloons, polythene, wool, rods, and electroscopes for charging and field mapping. Initiate with

learner-centered discussions on local experiences such as dust attraction or lightning, promote collaborative group investigations with differentiated tasks, peer feedback, and reflections connecting to Zambian safety concerns to build CBC analytical and problem-solving competencies.

SECTION 4: Competency-Based Assessment Ideas

1. Data compilation from charging different materials, evaluating induction effects (Analytical Thinking - Evaluate solutions).

2. Group activity sharing charged objects safely, fostering teamwork (Collaboration - Participate in and express themselves through play activities).

3. Presentation explaining lightning conductors with diagrams (Communication - Express oneself using different media and symbols).

4. Classification of materials as conductors or insulators from local samples (Critical Thinking - Classify objects according to their attributes).

5. Reflection on safe disposal after electrostatic experiments (Environmental Sustainability - Dispose trash in the designated place).

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

Learners can safely test static build-up on home plastics during dry seasons, applying earthing for shock prevention in Zambian households. In community awareness campaigns, demonstrate lightning safety rules, promoting rod installation in rural areas prone to storms. Participate in school projects building simple capacitors from foil, aiding basic electronics in provinces. Join clean-ups removing plastic litter that exacerbates static fires in markets. Observe and discuss charge effects in traditional hair braiding, linking to safe practices in cultural events across Zambia.