KENYA CERTIFICATE OF BASIC EDUCATION (K.C.B.E)

MARKING SCHEME

GRADE 10: AVIATION (Theory) – TERM 1 – JANUARY 2026

SECTION A (40 MARKS)

1. (a) Name two pioneers in the field of aviation.

Any two of the following:

- ✓ Sir George Cayley
- ✓ Montgolfier Brothers (Joseph & Étienne)
- ✓ Wright brothers
- ✓ Igor sikorsky

(b) Identify the following aircraft.

A. **Hot air balloon** / Lighter-than-air aircraft / Balloon
B. **Helicopter** / Rotary-wing aircraft

2. Explain two principles that allowed the balloon to rise.

Any relevant principles:

- ✓ Hot air is lighter than cold air.
- ✓ Warm air expands and becomes less dense.
- ✓ Lower density air rises above higher density air.
- ✓ Buoyancy lift principle.
- ✓ Convection currents push hot air upward.
- ✓ The heated air inside the balloon creates upward force.
- ✓ Archimedes principle of flotation.

3. State two characteristics of gliders that help them stay airborne.

- ✓ Long, wide wings (high aspect ratio).
- ✓ Very light weight.
- ✓ Smooth aerodynamic shape.
- ✓ Good lift-to-drag ratio.
- ✓ They use rising air currents (thermals).
- ✓ No heavy engines.
- ✓ High efficiency wings.
- ✓ Low wing loading.

4. Match the aircraft:

(a) **Fixed-wing aircraft → Aeroplane**
(b) **Rotary-wing aircraft → Helicopter**
(c) **Lighter-than-air aircraft → Hot air balloon**

5. Two reasons a helicopter is suitable for mountain rescue:

- ✓ Can take off and land vertically (VTOL).
- ✓ Can hover in one position.
- ✓ Can access tight or remote areas.
- ✓ Does not require runway.
- ✓ Can lower rescue ropes/winches.
- ✓ Quick response time.
- ✓ Better maneuverability.

6. Functions of cargo aircraft:

- ✓ Transport goods/freight.
- ✓ Deliver heavy machinery.
- ✓ Transport perishable goods (flowers/food).
- ✓ Carry humanitarian relief supplies.
- ✓ Military logistics.
- ✓ Deliver parcels/air mail.
- ✓ Transport medical supplies.
- ✓ Move animals/livestock.

7. Contributions of Wright Brothers:

- ✓ Invented the first successful powered aircraft.
- ✓ Introduced 3-axis aircraft control.
- ✓ Conducted scientific wind-tunnel testing.
- ✓ Improved propeller design.
- ✓ First controlled, powered, sustained flight (1903).
- ✓ Advanced aerodynamics research.

8. Roles of aerodromes:

- ✓ Provide landing/takeoff sites.
- ✓ Aircraft maintenance areas.
- ✓ Passenger and cargo handling.
- ✓ Refueling centre.
- ✓ Weather and navigation services.
- ✓ Security and customs processing.
- ✓ Pilot training.
- ✓ Aircraft parking.

9. Safety gear used by aviation technicians:

- ✓ Safety goggles.
- ✓ Protective gloves.
- ✓ Overalls/coveralls.
- ✓ Ear defenders/ear plugs.
- ✓ Safety boots.
- ✓ Hard hat/helmet.
- ✓ Respirator or face mask.
- ✓ High-visibility vest.
- ✓ Fire-resistant clothing.

10. Causes of electrical shock in aviation workshop:

- ✓ Exposed live wires.
- ✓ Faulty electrical equipment.
- ✓ Wet or damp surfaces.
- ✓ Overloaded circuits.
- ✓ Damaged insulation cables.
- ✓ Touching wires with bare hands.
- ✓ Improper grounding.
- ✓ Metal tools touching live circuits.

11. Why first aid is important in the aviation workplace:

- ✓ Saves lives.
- ✓ Prevents condition from worsening.
- ✓ Reduces pain.
- ✓ Helps stop bleeding.
- ✓ Prevents infection.
- ✓ Provides comfort to victim.
- ✓ Promotes quick recovery.
- ✓ Buys time before medical help arrives.

12. First aid for a cut on the hand:

- ✓ Apply pressure to stop bleeding.
- ✓ Clean the wound.
- ✓ Cover with sterile bandage.
- ✓ Raise the hand to reduce bleeding.
- ✓ Disinfect with antiseptic.
- ✓ Seek medical attention.
- ✓ Avoid further contamination.

13. Hazards in an aircraft hangar:

- ✓ Slippery floors.
- ✓ Falling tools.
- ✓ Noise hazards.
- ✓ Chemical exposure (fuels).
- ✓ Sharp edges.
- ✓ Moving aircraft.
- ✓ Electrical hazards.
- ✓ Fire hazards.

14. Signs that a person may require CPR:

- ✓ Not breathing.
- ✓ No pulse.
- ✓ Unresponsive/unconscious.
- ✓ Gasping/agonal breathing.
- ✓ Bluish skin (cyanosis).
- ✓ No chest movement.

SECTION B (60 MARKS)

15. (a) Contribution of Montgolfier Brothers' hot air balloon:

- ✓ Proved hot air can lift objects.
- ✓ First human flight attempt.
- ✓ Demonstrated lighter-than-air flight.
- ✓ Inspired future balloon and airship designs.
- ✓ Showed heated air creates buoyancy.
- ✓ Led to scientific study of aerostatics.

(b) Ideas introduced by Sir George Cayley:

- ✓ Concept of lift, drag, thrust, and weight.
- ✓ Separation of lift and propulsion systems.
- ✓ Fixed-wing aircraft concept.
- ✓ Streamlined fuselage shape.
- ✓ Understanding of centre of gravity.
- ✓ Introduction of tailplane for stability.

(c) Differences between heavier-than-air and lighter-than-air aircraft:

Heavier-than-air	Lighter-than-air
Require engines for lift	Use buoyant gases for lift
Examples: airplanes, helicopters	Examples: balloons, airships
Made of heavy materials	Usually made with flexible envelope
Need runways (some)	May rise vertically without runway
Higher speed	Slower speed
Can carry more load	Limited lifting capacity
Highly maneuverable	Poor maneuverability

(d) Importance of early gliders:

- ✓ Helped test aerodynamics.
- ✓ Provided understanding of lift.
- ✓ Developed aircraft control systems.
- ✓ Formed basis for powered flight.

16. (a) Functions of aircraft displayed:

Military jet:

- ✓ Defense/warfare
- ✓ Surveillance
- ✓ Training
- ✓ Transport of military personnel

Passenger airliner:

- ✓ Carry passengers
- ✓ Long-distance travel
- ✓ Tourism promotion

Crop-spraying aircraft:

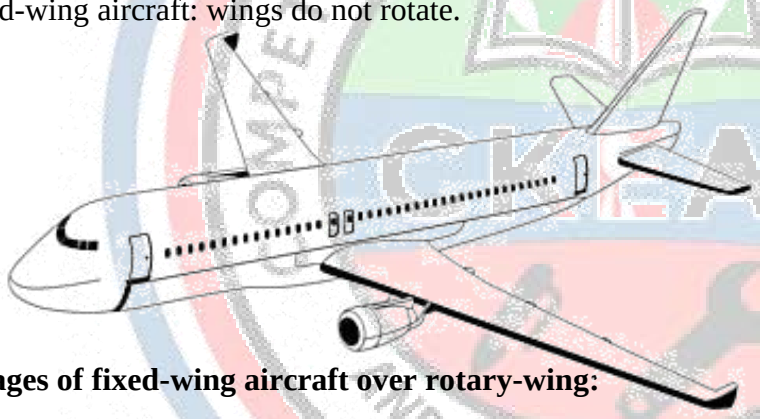
- ✓ Apply pesticides
- ✓ Spread fertilizers
- ✓ Seed planting
- ✓ Farm dusting operations

(b) Sketch differentiation:

(Accept any clear labelled diagrams showing:)

- ✓ Rotary-wing aircraft: rotor blades rotate to produce lift.

- ✓ Fixed-wing aircraft: wings do not rotate.



(c) Advantages of fixed-wing aircraft over rotary-wing:

- ✓ Faster.
- ✓ More fuel-efficient.
- ✓ Greater range.
- ✓ Carry more passengers/cargo.
- ✓ More stable in flight.
- ✓ Lower maintenance cost.

(d) Why lighter-than-air aircraft are rarely used today:

- ✓ Very slow.
- ✓ Easily affected by weather/wind.
- ✓ Limited passenger capacity.
- ✓ High operation cost.
- ✓ Safety concerns (historical accidents e.g., Hindenburg).

17. (a) How an airstrip contributes to economic development:

- ✓ Promotes tourism.
- ✓ Creates employment.
- ✓ Faster transport of goods.
- ✓ Attracts investors.
- ✓ Supports emergency services.
- ✓ Opens remote areas.
- ✓ Facilitates trade and business.
- ✓ Enhances farming (air spraying).

(b) Importance of aviation in emergency response:

- ✓ Quick evacuation of casualties.
- ✓ Fast delivery of medical supplies.
- ✓ Access remote disaster areas.
- ✓ Search and rescue operations.

(c) Disadvantages of air transport:

- ✓ Very expensive.
- ✓ Affected by weather.
- ✓ Noise pollution.
- ✓ Air pollution.
- ✓ Limited to areas with airfields.
- ✓ Strict safety measures required.

18. (a) General rules of personal safety:

- ✓ Wear safety gear.
- ✓ Keep workspace clean.
- ✓ Avoid running in hangar.
- ✓ Handle chemicals with care.
- ✓ Follow instructions.
- ✓ Avoid loose clothing.
- ✓ Stay alert.
- ✓ Keep tools in good condition.

(b) Hazards around aircraft:

- ✓ Spinning propellers.
- ✓ Jet blast.
- ✓ Noise exposure.
- ✓ Slippery fuel spills.
- ✓ Sharp edges on aircraft parts.
- ✓ Falling objects.

(c) First aid for electric shock:

- ✓ Switch off power source.
- ✓ Do not touch victim with bare hands.
- ✓ Call for help.
- ✓ Check breathing and pulse.
- ✓ Begin CPR if needed.
- ✓ Treat burns.
- ✓ Keep victim warm.

(d) Safety measures to prevent burns:

- ✓ Avoid touching hot surfaces.
- ✓ Wear heat-resistant gloves.
- ✓ Keep fire extinguishers ready.
- ✓ Proper storage of flammable materials.

(e) Why housekeeping is important:

- ✓ Reduces accidents.
- ✓ Improves efficiency.
- ✓ Prevents fire hazards.
- ✓ Ensures easy movement.

19. (a) Signs of a fracture:

- ✓ Severe pain.
- ✓ Swelling.
- ✓ Deformity of limb.
- ✓ Bruising.
- ✓ Inability to move limb.
- ✓ Bone sticking out (open fracture).

(b) First aid for fracture:

- ✓ Immobilize the injured part.
- ✓ Apply splints.
- ✓ Do not move the victim unnecessarily.
- ✓ Cover bleeding wounds.
- ✓ Call for medical help.
- ✓ Support limb with sling.

(c) First aid for burns:

- ✓ Remove the victim from heat source.
- ✓ Cool the burn with running water.
- ✓ Apply sterile dressing.
- ✓ Do not burst blisters.
- ✓ Remove tight clothing or jewelry.
- ✓ Seek medical care.

(d) Steps of performing CPR:

- ✓ Check responsiveness.
- ✓ Open airway.
- ✓ Check breathing.
- ✓ Begin chest compressions (30).
- ✓ Give rescue breaths (2).
- ✓ Continue 30:2 cycle.
- ✓ Call emergency services.

NOTE TO FACILITATORS (TEACHERS):

The marking scheme provided is not exhaustive. Facilitators are advised to use their professional judgment when awarding marks. Any correct, relevant, and scientifically or contextually acceptable answer that demonstrates understanding of the concepts should be credited. Where examples are required, learners may provide other valid examples apart from those listed in the scheme.

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