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

MARKING SCHEME

GRADE 10: POWER MECHANICS – TERM 1 – JANUARY 2026

SECTION A (30 Marks)

1. Vehicle engine & Power Mechanics

a) **Power Mechanics:**

- ✓ Power Mechanics is the branch of science and engineering that deals with the study, operation, and maintenance of machines and systems that produce, transmit, and use mechanical power.
- ✓ It involves engines, vehicles, power tools, and hydraulic and pneumatic systems.

b) **Two main systems studied under Power Mechanics:**
i. **Engine system** – includes petrol, diesel, and gas engines.
ii. **Transmission system** – includes gears, clutches, and drive shafts.
iii. **Hydraulic and pneumatic systems** – for movement control.
iv. **Electrical and ignition systems** – for vehicle operation.

c) **Founders of automobile:**

- ✓ Karl Benz (Germany)
- ✓ Gottlieb Daimler (Germany)

d) **Power sources for automobiles:**
i. Petrol / Gasoline engines
ii. Diesel engines
iii. Electric motors / Hybrid engines

2. Importance of Power Mechanics in everyday life

i. Enables operation of vehicles (cars, buses, motorcycles) for transport.
ii. Powers generators for electricity supply in homes and businesses.
iii. Supports agricultural machines like tractors and harvesters.
iv. Facilitates manufacturing and construction industries.

3. Hydraulic excavator

a) **Type of system controlling the arm:**

- Hydraulic system

b) **Operation of the hydraulic system:**

- ✓ Uses fluid under pressure to transmit force.
- ✓ Pump forces hydraulic oil into cylinders → pistons move → arm moves.
- ✓ Valves control direction and speed of fluid → smooth operation.

4. Workshop sections

a) **Three main areas in a power mechanics workshop:**
i. Engine repair section
ii. Transmission and gear section
iii. Hydraulic / pneumatic section
iv. Electrical / ignition section
v. Tool and equipment storage

b) **Importance of organizing workshop layout:**

- ✓ Improves efficiency and workflow.
- ✓ Reduces accidents and damage to tools.
- ✓ Ensures easy access to tools and equipment.

5. Careers and skills in Power Mechanics

a) **Careers related to Power Mechanics:**
i. Automotive mechanic
ii. Diesel mechanic / tractor mechanic
iii. Aircraft mechanic
iv. Marine engineer
v. Hydraulic system technician

b) **Skill required:**

- ✓ Technical knowledge of engines and machinery.
- ✓ Problem-solving and diagnostic skills.
- ✓ Manual dexterity and ability to use tools safely.

6. Safety signs and PPE

a) **Matching signs with meanings:**

Sign	Meaning
(i) 	*(i) No Smoking Sign*
(ii) 	*ii) Wear Safety Goggles Sign*
(iii) 	*(iii) High Voltage Sign*

b) **Types of PPE in workshop:**
i. Safety goggles / face shields
ii. Gloves (insulated, heat resistant)
iii. Overalls / aprons
iv. Safety boots
v. Ear muffs / ear plugs

7. Contribution to national development

i. Supports transport and logistics → facilitates trade and industry.
ii. Encourages mechanized agriculture → increases food production.
iii. Promotes industrial growth → construction, manufacturing, and energy production.
iv. Creates employment opportunities in mechanical sectors.

8. Working under vehicles

a) **Precaution before working under a vehicle:**

- Ensure the vehicle is properly supported using a jack stand or blocks.

b) **Importance:**
i. Prevents the vehicle from falling → avoids injuries or death.
ii. Ensures stability → safer working environment.

SECTION B (40 Marks)

9. Evolution of the automobile

a) **Four major stages:**
i. **Steam-powered vehicles** – early 19th century, slow and heavy.
ii. **Internal combustion engine vehicles** – petrol/diesel engines invented by Benz and Daimler.
iii. **Mass production** – Henry Ford introduced assembly line → cars affordable.
iv. **Modern vehicles** – electric, hybrid, and computer-controlled systems.

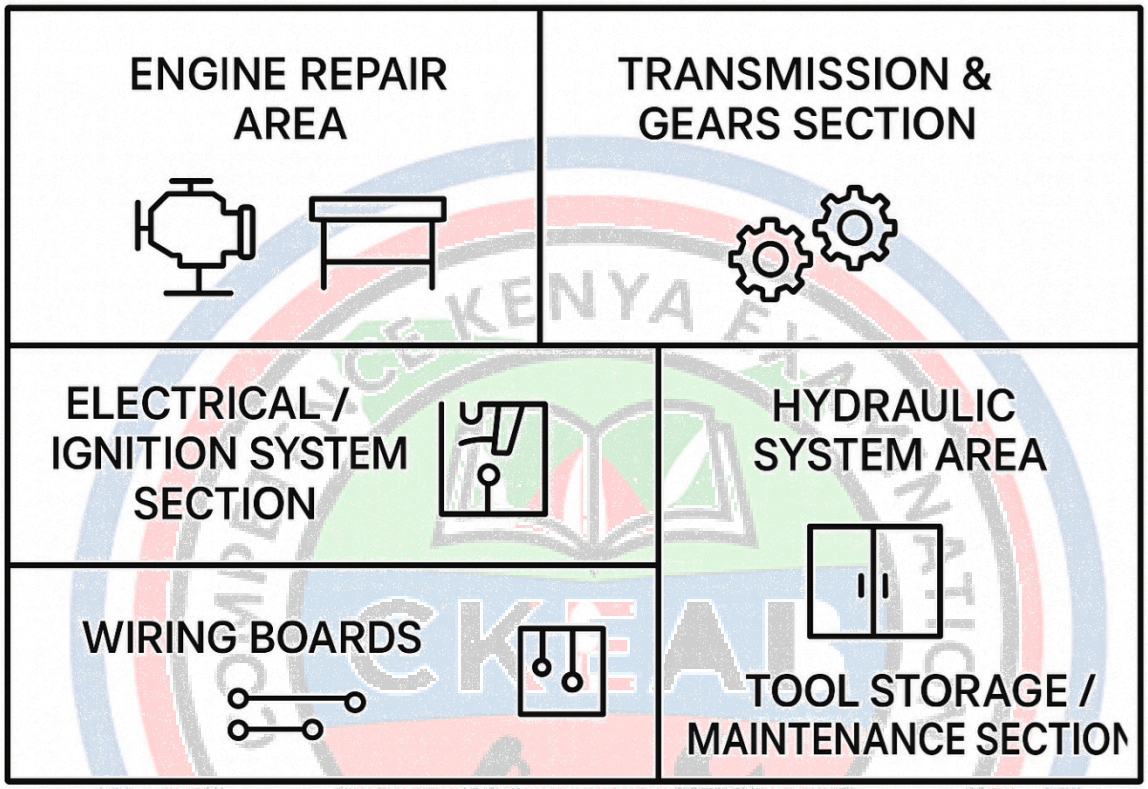
b) **Two ways innovation improved modern vehicles:**
i. Improved fuel efficiency → reduces costs and environmental pollution.
ii. Enhanced safety features → airbags, ABS, seat belts, collision sensors.
iii. Comfort and convenience → air conditioning, GPS, power steering.
iv. Automation → hybrid/electric vehicles, driver-assist systems.

10. Workshop layout and safety

a) **Three benefits of organized workshop layout:**
i. Saves time by reducing movement to access tools.
ii. Reduces accidents by separating hazardous areas.
iii. Ensures proper storage and maintenance of tools and equipment.

b) **Simple layout sketch (descriptive labels):**

- Sections:
  i. Engine repair area
  ii. Transmission and gears section
  iii. Hydraulic system area
  iv. Electrical / ignition system section
  v. Tool storage / maintenance section



c) **Two safety features in a workshop:**
i. Fire extinguishers and emergency exits
ii. Warning signs (high voltage, no smoking)

11. Automotive vs Agricultural machinery workshop

Feature	Automotive Workshop	Agricultural Machinery Workshop
i. Machines worked on	Cars, trucks, motorcycles	Tractors, harvesters, ploughs
ii. Tools used	Spanners, diagnostic tools, lifts	Heavy lifting equipment, wrenches
iii. Layout	Smaller, compact areas	Larger, open spaces to handle big machinery

b) **Technology changes for mechanics:**
i. Computer diagnostics → easier detection of engine and electrical faults.
ii. Use of hydraulic lifts and CNC machines → reduces manual labor.
iii. Advanced welding and cutting tools → faster repairs and precision work.

12. Workshop safety & PPE

a) **Four general safety rules:**
i. Wear appropriate PPE (gloves, goggles, aprons).
ii. Keep workshop clean and organized.
iii. Follow proper lifting and handling techniques.
iv. Ensure electrical tools are well-maintained and insulated.
v. Avoid distractions and horseplay in the workshop.

b) **PPE for welding:**
i. Welding helmet / face shield
ii. Heat-resistant gloves / apron

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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