

KENYA CERTIFICATE OF BASIC EDUCATION

SENIOR SCHOOL ASSESSMENT

AUGUST ASSIGNMENT 2026

GRADE 10 – POWER MECHANICS

Time: 2 Hours 30 Minutes



LEARNER'S DETAILS

Name: _____ . School: _____ .

Assessment Number: _____ . Date: _____ .

School Code: _____ . Signature: _____ .

INSTRUCTIONS TO CANDIDATES

1. Write your name in the spaces provided above.
2. Write the name of your school and your stream in the spaces provided.
3. Write your admission number and the date of the assessment in the spaces provided.
4. This paper consists of two sections: A and B.
5. Answer all questions in section A and section B.
6. Answer the questions in English.
7. All answers **MUST** be written in the spaces provided in the paper.
8. Do **NOT** remove any page from this question paper.
9. For technical drawing questions, ensure **all construction steps are clearly shown**

FOR OFFICIAL USE ONLY

SECTION	SECTION A	SECTION B	% SCORE	EE1	EE2	ME1	ME2	AE1	AE2	BE1	BE2
SCORE RANGE	30 MARKS	50 MARKS		90-100	75-89	58-74	41-57	31-40	21-30	11-20	1-10
POINTS				8 POINTS	7 POINTS	6 POINTS	5 POINTS	4 POINTS	3 POINTS	2 POINTS	1 POINT
LEARNER'S TOTAL SCORE											

SECTION A (30 MARKS)

Answer **ALL** questions in this section.

1. Three learners at **Muranga School** are discussing their future in the Power Mechanics industry.

Kamau: "I want to design new engine systems for electric cars."

Mutua: "I want to work in the **Service and Repair** sector at a garage in **Machakos**."

Otieno: "I am interested in **Marine Engineering**, working on ship engines in **Mombasa**."

- (a) **Identify** the specific career path Kamau is interested in. (1 mark)
-

(b) **Name** the branch of power mechanics that Otieno's interest falls under. (1 mark)

(c) **List** three activities related to power mechanics that can be found in a local shopping center. (3 marks)

- i. _____
- ii. _____
- iii. _____

2. Study the workshop diagram below showing a standard power mechanics layout.



A



D

(a) **Identify** the area labeled **A** and **D**. (2 marks)

A: _____
D: _____

(b) **Select** the correct Personal Protective Equipment (PPE) from the list below that a learner must wear when handling a battery in the workshop:

Respirator Rubber Gloves Welding Shield (1 mark)

(c) **Explain** the importance of maintaining clear **Passageways (D)** in a workshop. (2 marks)

- i. _____
- ii. _____

3. A Grade 10 learner at **Amapera Senior School** is inspecting a tire with the following markings: **205/55 R 16**.

(a) **Identify** what the letter **R** stands for in the specification. (1 mark)

(b) **Distinguish** between **Tube** and **Tubeless** tires based on their construction. (2 marks)

Tube tire	Tubeless tire

(c) **Name** the two types of tire ply orientations used in vehicles. (2 marks)

- i. _____
- ii. _____

4. Technical drawing is essential for power mechanics. Study the mechanism below.

(a) **Define** the term "Locus" as used in technical drawing. (1 mark)

(b) **Identify** the type of locus produced by a point on a circle rolling along a straight line. (1 mark)

(c) **Outline** the method for constructing an **Internal Tangent** to two unequal circles. (3 marks)

- i. _____
- ii. _____
- iii. _____

5. (a) **Match** the vehicle body type in Column A with its correct description in Column B. (5 marks)

Column A

Column B

- (i) Station Wagon (A) A vehicle with an open cargo area and a cabin.
- (ii) Convertible (B) A car with a roof that can be folded down or removed.
- (iii) Pickup (C) A car with an extended roof and a hatch at the back for luggage.
- (iv) Saloon (D) A large vehicle designed to carry many passengers.
- (v) Bus (E) A standard car with four doors and a separate boot.

(b) **Identify** the two types of chassis construction shown in the images below. (2 marks)

- i. _____
- ii. _____

(c) **State** three functions of a vehicle chassis. (3 marks)

- i. _____
- ii. _____
- iii. _____

SECTION B (50 MARKS)

6. Below is an exploded view of a single-cylinder internal combustion engine.



(a) **Name** the components labeled **X**, **Y**, **Z**, and **W**. (4 marks)

- X: _____ Y: _____
Z: _____ W: _____

(b) **Describe** the function of the **Crankshaft (Y)** in relation to the piston's motion. (3 marks)

- i. _____
- ii. _____
- iii. _____

(c) **Explain** the purpose of the **Camshaft (W)** in the valve timing mechanism. (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) **Compare** the material used for the **Cylinder Block** versus the **Sump**. (3 marks)

Cylinder block	Sump

(e) **Identify** the component that seals the top of the cylinder block. (2 marks)

- i. _____
- ii. _____

7. A mechanic in **Thika** is performing a precision measurement on an engine block.



S



T

(a) **Identify** the tools being used in the pictures above. (2 marks)

S: _____

T: _____

(b) **Explain** why it is necessary to measure the **Cylinder Bore** for "ovalness" and "taper." (4 marks)

- i. _____
- ii. _____
- iii. _____

(c) **Describe** the procedure for measuring the **Piston Ring Gap** using a feeler gauge. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(d) **Calculate** the engine capacity in cm^3 if the bore is 80mm and the stroke is 90mm (use $\pi=3.142$). (3 marks)

(e) **Mention** the unit used to express Engine Power in the SI system. (2 marks)

- i. _____
- ii. _____

8. (a) **Distinguish** between an **Internal Combustion Engine (ICE)** and an **External Combustion Engine (ECE)** using the table below. (4 marks)

Feature	Internal Combustion	External Combustion
Location of Combustion		
Common Example		

(b) Write **True or False** in the following statement:

The "Big Bang" theory is related to the evolution of the first steam engine. [_____] (1 mark)

(c) **Identify** the engine cylinder layout shown in the diagrams below. (3 marks)

- i. _____
- ii. _____
- iii. _____

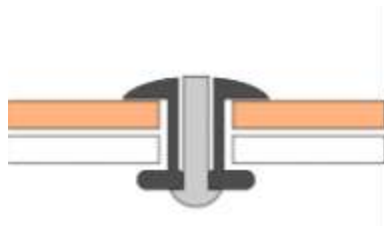
(d) **State** one key trend in the historical development of automobiles regarding fuel efficiency. (2 marks)

- i. _____
- ii. _____

9. (a) **Identify** the three joining components shown below. (3 marks)



i



ii



iii

- i. _____
- ii. _____
- iii. _____

(b) **Define** the terms "Adhesion" and "Cohesion" as used in vehicle body repairs. (2 marks)

(c) **Explain** the process of **Riveting** when joining two metal sheets of a vehicle body. (3 marks)

- i.

- ii.

- iii.

(d) **List** two types of threaded fasteners used in engine assembly. (2 marks)

- i.

- ii.

MARKING SCHEME

LEARNING AREA: POWER MECHANICS GRADE: 10 (SENIOR SCHOOL)

SECTION A (30 MARKS)

1. Fundamentals & Careers (5 Marks)

(a) **Career:** Automotive Engineer / Design Engineer. (1mk)

(b) **Branch:** Marine Power Mechanics / Marine Engineering. (1mk)

(c) **Activities:** Vehicle servicing (oil change), tire mending/vulcanizing, motorbike (boda boda) repair, welding of exhaust pipes, or battery charging. (Any 3 = 3mks)

2. Workshop Layout and Safety (5 Marks)

(a) **Identification:** A: Tool room. D: Passageways/Walkways. (2mks)

(b) **PPE:** Rubber Gloves (Chemical resistant for battery acid). (1mk)

(c) **Importance:** To ensure free movement of personnel and equipment, and to provide clear exit routes during emergencies (fire or accidents). (2mks)

3. Vehicle Systems: Wheels and Tires (5 Marks)

(a) **Identification:** R stands for **Radial** (referring to the ply construction). (1mk)

(b) **Distinguish:** **Tube tires** have an inner rubber tube that holds air; **Tubeless tires** have an airtight inner liner bonded to the casing and seal directly against the wheel rim. (2mks)

(c) **Orientations:** Radial ply and Cross ply (Bias ply). (2mks)

4. Related Drawing (5 Marks)

(a) **Definition:** A locus is the path traced by a point as it moves according to a specific mathematical or mechanical rule. (1mk)

(b) **Identification:** Cycloid. (1mk)

(c) **Method:**

1. Draw a line connecting the centers of the two circles.
2. Draw a circle with a radius equal to the *sum* of the two radii (R_1+R_2).
3. Construct a tangent from the center of the smaller circle to this new circle. (3mks)

5. Vehicle Body and Chassis (10 Marks)

(a) **Matching:** (i)—C, (ii)—B, (iii)—A, (iv)—E, (v)—D. (5mks)

(b) **Chassis Types:** 1. Separate (Body-on-frame) 2. Integral (Monocoque/Unibody). (2mks)

(c) **Functions:** To support the weight of vehicle components (engine, body, passengers); to withstand stresses from movement; to provide mounting points for suspension and wheels. (3mks)

SECTION B (50 MARKS)

6. Engine Components and Functions (15 Marks)

(a) **Naming:** X: Piston. Y: Crankshaft. Z: Connecting Rod. W: Camshaft. (4mks)

(b) **Crankshaft Function:** It converts the reciprocating (up and down) motion of the piston into rotary (turning) motion to drive the wheels. (3mks)

(c) **Camshaft Function:** It controls the opening and closing of the intake and exhaust valves at the correct time during the engine cycle. (3mks)

(d) **Comparison:** The **Cylinder Block** is usually made of cast iron or aluminum alloy for strength and heat dissipation; the **Sump** is often made of pressed steel or light alloy as its main job is to hold oil, not withstand combustion. (3mks)

(e) **Component:** Cylinder Head. (2mks)

7. Engine Measurements and Tools (15 Marks)

(a) **Tools:** Inside Micrometer and Feeler Gauge. (2mks)

(b) **Reason:** To ensure the cylinder is perfectly round and uniform. "Ovalness" occurs from side-thrust wear; "Taper" occurs because wear is higher at the top (TDC) where heat and pressure are greatest. (4mks)

(c) **Procedure:** Place the ring into the cylinder, use a piston to push it down so it sits square, and then insert the feeler gauge into the gap to check the clearance. (4mks)

(d) **Calculation:** $\text{Volume} = \pi \times r^2 \times h$ $r = 40\text{mm} = 4\text{cm}$; $h = 9\text{cm}$ $V = 3.142 \times (4 \times 4) \times 9 = 452.45\text{cm}^3$. (3mks)

(e) **Unit:** Watt (W) or Kilowatt (kW). (2mks)

8. Evolution and Classification (10 Marks)

(a) **Table:**

ICE: Inside the engine (e.g., Petrol/Diesel engine).

ECE: Outside the engine (e.g., Steam engine/Turbine). (4mks)

(b) True/False: FALSE. (1mk)

(c) Layouts: 1. In-line 2. V-engine 3. Opposed (Flat/Boxer). (3mks)

(d) Trend: Movement towards lighter materials, turbocharging, and hybrid/electric systems to reduce fuel consumption and emissions. (2mks)

9. Vehicle Body Joining (10 Marks)

(a) Identification: 1. Bolt & Nut 2. Pop Rivet 3. Circlip. (3mks)

(b) Definitions: **Adhesion** is the force of attraction between different substances; **Cohesion** is the force of attraction between the same molecules within a substance. (2mks)

(c) Riveting: A hole is drilled through both sheets, a rivet is inserted, and the "tail" is deformed (expanded) using a rivet gun to lock the sheets together. (3mks)

(d) Fasteners: Studs, Cap screws, or Machine bolts. (2mks)