KENYA CERTIFICATE OF BASIC EDUCATION

SENIOR SCHOOL ASSESSMENT

TERM 2 ENDTERM ASSESSMENTS 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 (EXAMINER'S USE)

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 **Mombasa Senior School** are discussing the future of Power Mechanics.

   - **Abdi:** "I want to design high-speed electric trains in Nairobi."
   - **Bakari:** "I am interested in repairing heavy-duty tractor engines in Narok."
   - **Chantal:** "I want to work for a car manufacturing plant in Thika."

(a) **List** three career opportunities Abdi, Bakari, and Chantal are aiming for. (3 marks)

i. _____

ii. _____

iii. _____

(b) **Outline** the importance of Power Mechanics in the agricultural sector of Kenya. (2 marks)

i. _____

ii. _____

2. In the **Nanyuki Senior School** workshop, the following safety signs are displayed.

Q

R

(a) **Identify** and **Name** the type of safety signs shown above. (2 marks)

Q: _____

R:_____

(b) **State** the specific Personal Protective Equipment (PPE) required when working under a vehicle chassis. (2 marks)

i. _____

ii. _____

(c) **True or False:**

It is safe to use a screwdriver as a chisel in the workshop. [_____] (1 mark)

3. Study the geometric illustration below showing a link mechanism used in a pump in **Kisumu**.

(a) **Define** the term *Locus* as used in technical drawing. (2 marks)

_____

_____

(b) **Identify** the method used to construct the tangent labeled **FL and PJ** (1 mark)

_____

_____

(c) **Name** the locus shape generated by a point on a circle rolling along a straight line. (1 mark)

_____

(d) **Mention** one application of link mechanisms in an automobile engine. (2 marks)

_____

_____

4. A mechanic in **Eldoret** is inspecting a tire with the following specification: **205/55 R 16**.

(a) **Interpret** the tire specification "R" and "16". (2 marks)

_____

_____

(b) **Identify** the ply orientation shown in the cross-section diagram below. (1 mark)

_____

(c) **List** two functions of the road wheels in a moving vehicle. (2 marks)

iii. _____

iv. _____

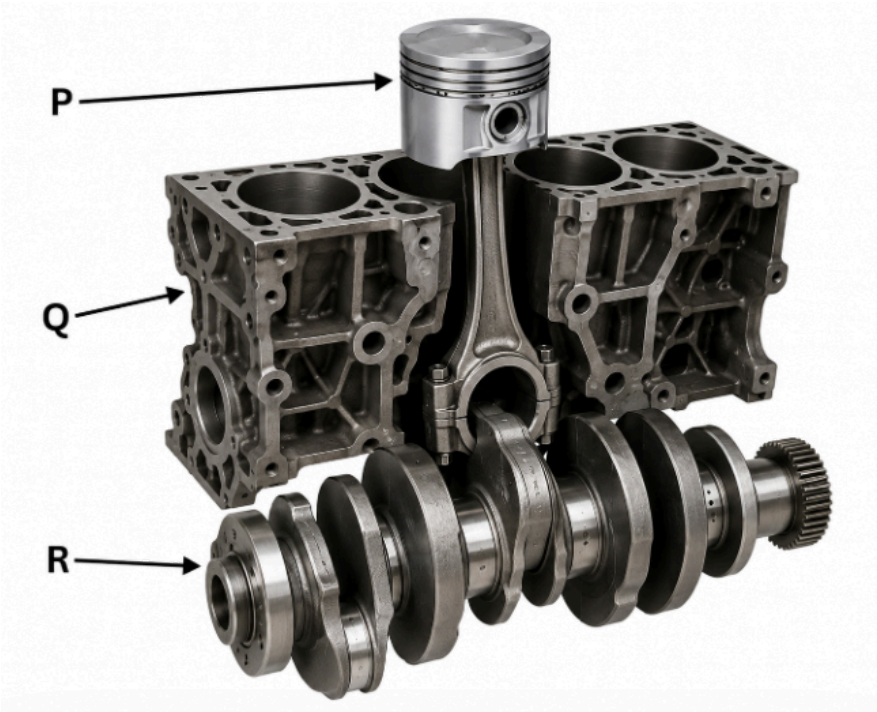
(d) **Distinguish** between a tube tire and a tubeless tire. (1 mark)

_____

_____

_____

5. Study the diagram of the Internal Combustion Engine (ICE) components used at **Kabarak High School**.



(a) **Identify** and **Name** the parts labeled **P, Q, and R**. (3 marks)

P: _____

Q: _____

R: _____

(b) **Define** the term *Bore* as used in engine measurements. (1 mark)

_____

_____

(c) A single-cylinder engine has a bore of 80mm and a stroke of 90mm. **Calculate** the engine capacity. (Take π = 3.142). (3 marks)

(d) **Select** the correct engine cycle: Is the piston at TDC or BDC during the start of the power stroke? (1 mark)

_____

SECTION B: [50 MARKS]

Answer ALL questions in the spaces provided.

6. The Board of Management at **Butere Girls School** wants to set up a new Power Mechanics workshop. You are provided with a list of areas: *Storage, Office, Workbenches, and Passage Ways.*

(a) **Sketch** a simple layout of a standard Power Mechanics workshop showing the four areas mentioned. (4 marks)

(b) **Explain** why the "Storage Area" should be separated from the "Working Area." (3 marks)

_____

_____

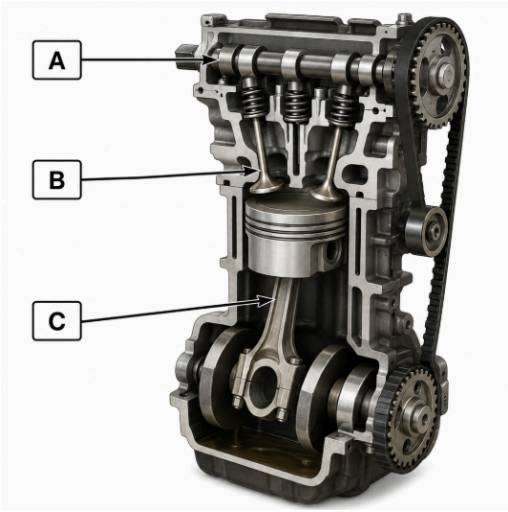
(c) **Describe** the importance of clear "Passage Ways" in a workshop environment. (3 marks)

i. _____

ii. _____

iii. _____

7. During a practical lesson at **Machakos Boys**, learners are stripping a four-stroke petrol engine. They encounter the following components:



(a) **Name** the components labeled **A, B, and C**. (3 marks)

A:_____

B:_____

C: _____

(b) **Describe** the function of the **Camshaft** in relation to the **Valves**. (3 marks)

i. _____

ii. _____

iii. _____

(c) **Match** the component to its function: (4 marks)

Component	**Function**
Piston Rings	(i) Converts reciprocating motion to rotary motion
Crankshaft	(ii) Connects the piston to the crankshaft

Connecting Rod	(iii) Houses the cooling water jackets
Cylinder Block	(iv) Prevents compression leakage

(d) **Outline** the importance of the **Sump** in a vehicle's lubrication system. (4 marks)

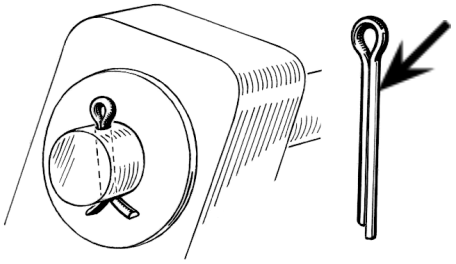
i. _____

ii. _____

iii. _____

8. A vehicle body specialist in **Juja** is repairing a station wagon body. He needs to choose between threaded fasteners, rivets, and adhesives.

(a) **Identify** the locking device shown in the picture above. (1 mark)



_____

(b) **Explain** the process of **Riveting** as applied to joining thin sheet metals of a vehicle body. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) **Compare** the use of **Adhesives** versus **Bolts and Nuts** in terms of permanent versus temporary joining. (4 marks)

Adhesives	**Bolts and Nuts**

(d) **Mention** three interior body parts of a modern Kenyan bus. (3 marks)

i. _____

ii. _____

iii. _____

9. Technicians at **Ganjoni Garage** in **Mombasa** are performing an engine overhaul. They are using specialized tools to measure wear.

(a) **Identify** the tool being used to measure the **Crankshaft Journal**. (1 mark)

_____

(b) **Explain** how to measure the **Piston Ring Gap** using a feeler gauge. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) **Distinguish** between a **Cylinder Bore** and **Cylinder Clearance**. (4 marks)

Cylinder bore	**Cylinder clearance**

(d) **Discuss** why measuring the **Journal** diameter is critical before installing new bearings. (5 marks)

i. _____

ii. _____

iii. _____

iv. _____

v. _____

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MARKING SCHEME

SECTION A: [30 MARKS]

1.

(a) Career Opportunities:

Locomotive Engineer (Abdi's interest in trains).

Agricultural Machinery Technician (Bakari's interest in tractors).

Plant Maintenance Engineer / Automotive Assembly Technician (Chantal's interest in manufacturing).

(b) Importance in Agriculture: It ensures the efficient maintenance and operation of farm machinery (tractors, irrigation pumps, harvesters), which increases food production and reduces manual labor.

2.

(a) Sign Identification:

Mandatory Sign: (e.g., "Wear Eye Protection") – Blue background, white symbol.

Warning Sign: (e.g., "High Voltage" or "Crush Zone") – Yellow triangle, black border.

(b) PPE for Chassis Work: Safety goggles (to protect eyes from falling debris), overalls (to protect skin), and safety boots (to protect feet from falling parts).

(c) Answer: False (A screwdriver is a precision tool; using it as a chisel ruins the tip and can cause it to shatter).

3.

(a) Locus: The path traced by a point as it moves according to a specific geometric rule or constraint.

(b) Method: External Tangent (The tangent touches the outside of the two circles).

(c) Locus Shape: Cycloid.

(d) Application: The path of the connecting rod as it turns the crankshaft, or the movement of a valve opening and closing.

4.

(a) Interpretation:

R: Radial Construction (the direction of the ply cords).

16: The diameter of the wheel rim in **inches**.

(b) Ply Orientation: Radial Ply (Cords run at 90 degrees to the direction of travel).

(c) Functions: Supports the vehicle's weight, provides traction/grip on the road, and absorbs road shocks.

(d) Distinction: A **tube tire** relies on an internal rubber bladder to hold air, whereas a **tubeless tire** creates an airtight seal directly against the rim of the wheel.

5.

(a) Parts Identification:

P: Piston.

Q: Cylinder Block (or Engine Block).

R: Crankshaft.

(b) Bore: The internal diameter of the engine cylinder.

(c) Calculation:

Formula: $Volume = \pi \times r^2 \times stroke$

Radius (r) = 80mm/2=40mm=4cm. Stroke = 90mm=9cm.

$V = 3.142 \times (4)^2 \times 9$

Answer: 452.45 cm3.

(d) Position: TDC (Top Dead Centre).

SECTION B: [50 MARKS]

6.

(a) Sketching: Marks awarded for grouping the Office/Entrance together and keeping Workbenches away from high-traffic Passage Ways.

(b) Storage Separation: To prevent unauthorized access to expensive tools, reduce clutter in the work area, and ensure flammable materials (oil/grease) are kept away from sparks.

(c) Passage Ways: Essential for the safe movement of heavy components (like engines on cranes) and for clear evacuation routes during a fire or accident.

7.

(a) Components: A: Camshaft, **B:** Valve (Intake/Exhaust), **C:** Connecting Rod.

(b) Function: The Camshaft has "lobes" that rotate and push against the valves (or rocker arms) to open them at the precise time required for the intake or exhaust strokes.

(c) Matching:

Piston Rings → (iv) Prevents compression leakage.

Crankshaft → (i) Converts reciprocating motion to rotary motion.

Connecting Rod → (ii) Connects the piston to the crankshaft.

Cylinder Block → (iii) Houses the cooling water jackets.

(d) Sump Importance: It acts as a reservoir for engine oil, helps dissipate heat from the oil to the atmosphere, and protects the crankshaft from external damage.

8.

(a) Locking Device: Split Pin (or Cotter Pin).

(b) Riveting Process: A hole is drilled through both metal sheets; the rivet is inserted, and a rivet gun "upsets" or flattens the tail end to squeeze the sheets together permanently.

(c) Comparison: Adhesives provide a permanent, lightweight bond and a smooth finish (no visible holes), while **Bolts and Nuts** are temporary/semi-permanent, allowing for easy disassembly for repairs.

(d) Interior Parts: Dashboard, passenger seats, floor mats, and interior door handles.

9.

(a) Tool: Outside Micrometer.

(b) Piston Ring Gap: Insert the ring into the cylinder, use a piston to square it up, then insert a **feeler gauge** into the gap between the ring ends to check for wear.

(c) Distinction: Cylinder Bore is the actual width of the cylinder hole; **Cylinder Clearance** is the tiny gap between the piston skirt and the cylinder wall to allow for thermal expansion.

(d) Journal Discussion: If the journal is "out-of-round" or worn down, it will not hold oil pressure correctly, leading to "knocking" and eventual engine seizure. Precision measurement ensures the correct size of replacement bearings is used.