

3.5 POWER MECHANICS (447)

The **2021 KCSE** examinations for Power Mechanics consisted of two papers namely: Paper 1 (theory) and Paper 2 (Practical). There was no change in the format and weighting of the papers.

3.5.1 General Candidates Performance

The candidate's performance statistics since the year 2016 are as shown in the table below.

Table 11: candidates overall performance in the year 2016 to 2021

Year	Paper	Candidature	Maximum scores	Mean Score	Standard deviation
2016	1		60	37.30	8.25
	2		40	27.57	3.55
	Overall	162	100	64.87	9.95
2017	1		60	31.42	9.86
	2		40	30.10	3.99
	Overall	166	100	61.52	12.42
2018	1		60	27.46	11.48
	2		40	25.23	4.63
	Overall	219	100	52.69	16.11
2019	1		60	30.00	11.09
	2		40	25.00	6.01
	Overall	254	100	55.00	17.10
2020	1		60	34.77	11.03
	2		40	28.34	4.66
	Overall	276	100	63.12	14.4
2021	1		60	34.52	11.76
	2		40	28.57	5.59
	Overall	255	100	63.09	16.58

The table reveals that the performance in power mechanics in 2021 is comparable to that of 2020 as **63.09** and **63.12** respectively. It is also worth noting that the candidature has reduced from 276 in 2020 to 255 in 2021, which is about **8.23%** decline.

3.5.2 Power Mechanics Paper 1 (447/1)

Questions 11 (b), 13 (b)(ii) and 15 (a)(i) were reported to have been poorly performed. They are analyzed below.

Question 11

Figure 1 shows an isometric drawing of a bracket.

On the A3 paper provided, draw **FULL SIZE**, in first angle orthographic projection the following views:

- Front Elevation in the direction of arrow W
- End elevation in the direction of arrow X
- Plan

(15 marks)

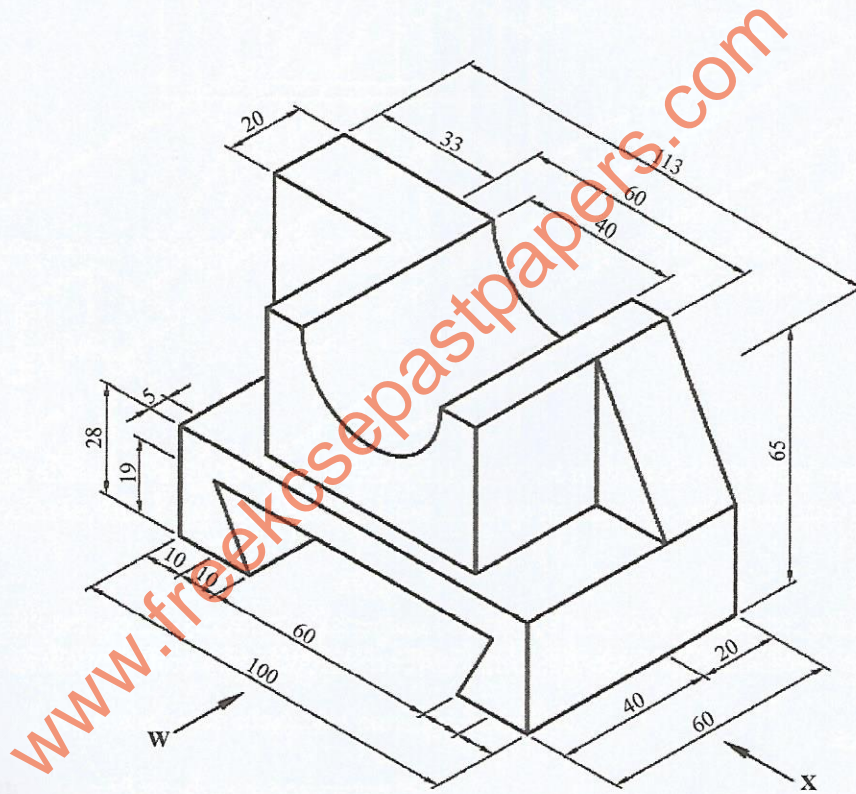


Figure 1

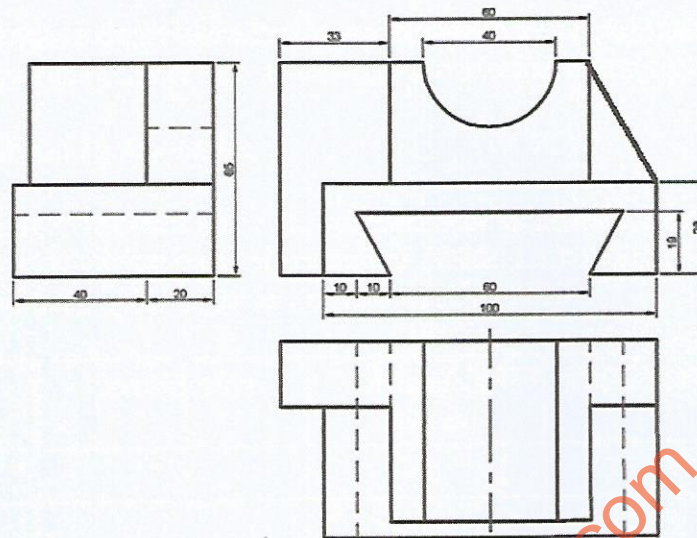
Weakness

A good percentage of the candidates had difficulties in coming up with a drawing of a **FULL SIZE**, in first angle orthographic projection of the front elevation, end elevation and the plan of the bracket provided.

Advice to teachers

Teachers are advised to provide more hands-on/ practical activities to the students during teaching and learning of orthographic projection drawings.

Expected response



Question 13 (b)(iii)

(iii) Explain the operation of the component (*Hydroelastic displacer unit*) under each of the following road conditions:

I. Pitch

(5 marks)

II. Bounce

(2 marks)

Weakness

Most of the candidate were unable to correctly identify the component (Hydroelastic displacer unit) hence could not explain how the suspension system work in terms of pitch and bounce.

Advice to teachers

Teachers are advised to expose the learners to various suspension systems during teaching and learning. This would enhance their ability to identify them correctly before they can explain how they work.

Expected responses.

I. Pitch

- When the vehicle experiences a sudden upward movement of the front wheel it causes the diaphragm to displace the fluid through the damper
- This forces fluid along the pipe to the rear unit where it will move the diaphragm and raise the rear unit of the car to the level of the front.
- When the front wheel descends, the fluid is returned, and the vehicle settles back to its normal riding position
- During this sequence, the fluid must pass the damper valve in each unit, so restriction to fluid flow at the valves and in the pipeline damps out any pitch oscillation tendency

II. Bounce

- When the vehicle bounces it causes the four wheels to deflect at the same time
- All the hydraulic units will then perform at the same time similarly to the outer units by stiffening the system

Question 15 (a)(i)

(i) Differentiate between clutch slip and clutch judder.

(4 marks)

Weakness

Most of the candidate were unable to correctly differentiate between the **Clutch slip and Clutch judder**.

Advice to teachers

Teachers are advised to give more practice exercises to candidates.

Expected responses.

- a) (i) - **Clutch slip** – refers to the tendency of the clutch to slip or spin, especially when accelerating. It generates a lot of heat and wear of clutch disk facing.
- **Clutch judder** – refers to the tendency of the clutch to grab or chatter when engaged and release sporadically.

3.5.3 Power Mechanics Paper 2 (447/2)

The paper had 10 equally weighted compulsory exercises. It tested competencies in the following areas:

- a) Sketching in good proportion an exploded drawing of a rear wheel leaf spring swing shackle.
- b) Fabricating a **scraper**.
- c) Identifying tools and fasteners.
- d) Determining the big end oil clearance at a torque of 20KN/m^2 s of a single cylinder engine provided
- e) Using the tools, materials and components provided to connect a lighting circuit such that two lamps are of the same brightness while the other two lamps are of different brightness.
- f) Identifying the parts of a vehicle system, the defect and the effect on vehicle performance
- g) Performing checks on the brake pads and reporting the conditions.
- h) Identifying the types of wear stating possible cause and selecting appropriate tool for taking measurements of the maximum tread depth, tyre width and the tyre pressure.
- i) Performing service checks on a fan belt of a multi-cylinder engine.
- j) Using the tools and materials to make a gasket.

NB: Most of the competencies were well exhibited by the candidates during the exam.