

### 3.3 METAL WORK (445)

The 2019 KCSE examinations for Electricity consisted of two papers namely Paper 1 (theory) and Paper 2 (Practical). The theory was worth 60% while practical was worth 40% of the final mark. Both papers followed the usual setting format as those of the previous years.

#### Candidates General Performance

The table below shows candidates' overall performance for the six year period, from 2014 to 2019.

**Table 10: Candidates' overall performance for the six year period, from 2014 to 2019**

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2014	1		60	36.44	8.86
	2		40	24.33	3.74
	<b>Overall</b>	<b>142</b>	<b>100</b>	<b>60.77</b>	<b>11.58</b>
2015	1		60	38.1	10.6
	2		40	25.41	5.16
	<b>Overall</b>	<b>120</b>	<b>100</b>	<b>63.51</b>	<b>14.8</b>
2016	1		60	35.36	11.19
	2		40	23.66	5.67
	<b>Overall</b>	<b>131</b>	<b>100</b>	<b>59.02</b>	<b>15.95</b>
2017	1		60	34.49	9.39
	2		40	23.04	4.29
	<b>Overall</b>	<b>115</b>	<b>100</b>	<b>57.53</b>	<b>12.82</b>
2018	1		60	29.92	11.2
	2		40	20.16	5.17
	<b>Overall</b>	<b>156</b>	<b>100</b>	<b>49.96</b>	<b>15.65</b>
2019	1		60	31.92	11.56
	2		40	21.35	5.37
	<b>Overall</b>	<b>194</b>	<b>100</b>	<b>53.26</b>	<b>15.72</b>

The following observations can be made from the above table,

- i) The candidature increased from 156 in 2018 to 194 in 2019.
- ii) The mean score increased from 49.96 in the year 2018 to 53.26 in 2019. This is an indication that the performance in 2019 was better than that of 2018.
- iii) The standard deviation increased slightly from 15.65 in 2018 to 15.72 in 2019.

#### 3.3.1 Metal Work Paper 1 (445/1)

The questions which were reported to have been poorly responded to have been analyzed with a view to pointing out candidates' weaknesses and propose suggestions on some remedial measures that need to be taken in order to improve performance in future. The questions for discussions include 3, 9, 11 and 15.

**Question 3 (b)**

Outline the procedure of taking readings on a vernier calliper

**Weaknesses**

Most of the candidates could not outline the procedure of taking readings.

**Advice to Teachers**

Teacher need to teach holistically including the use of instruments.

**Expected response**

- (i) The number of whole millimeters is read on the main scale on the left of Vernier zero mark
- (ii) Check the half millimeter, if any, on the left of Vernier zero mark
- (iii) Identify the number of Vernier scale divisions read from the vernier zero mark to the Vernier division coinciding with the main scale division multiply with the accuracy.
- (iv) Add the readings.

**Question 9**

Outline the procedure of center drilling a work piece on a lathe machine

**Weaknesses**

Most candidates could not outline the procedure of centre drilling.

**Advice to Teachers**

Teachers should teach all topics and explain clearly the procedures for particular processes.

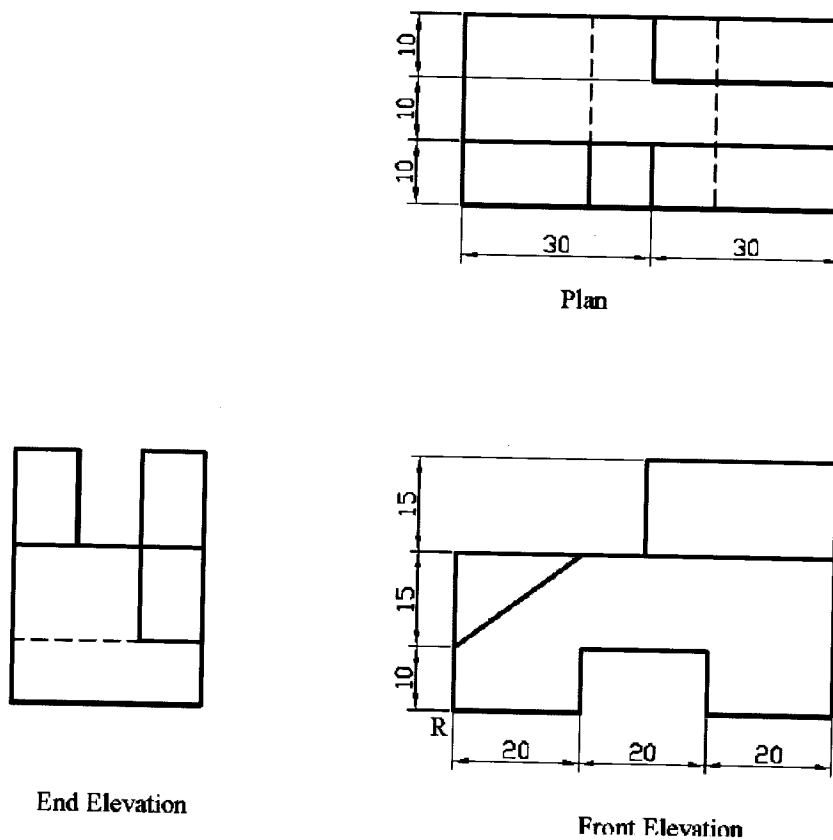
**Expected response**

Procedure of centre drilling on the lathe

- Face the work piece
- Fasten the centre drill in the tailstock chuck
- Lock the tailstock on the bed
- Turn on the machine
- Feed the centre and drill slowly into the face using the tailstock hand wheel
- Apply some oil onto the work piece

### Question 11

Figure 1 shows a machine block drawn in isometric projection.



To a scale of 2:1, draw the block in isometric projection taking R as the lowest point. (15 marks)

Draw **Full Size** in first angle projection the following views of the block:

- Front elevation as viewed in the direction of arrow F.E
- End elevation E.E
- Plan

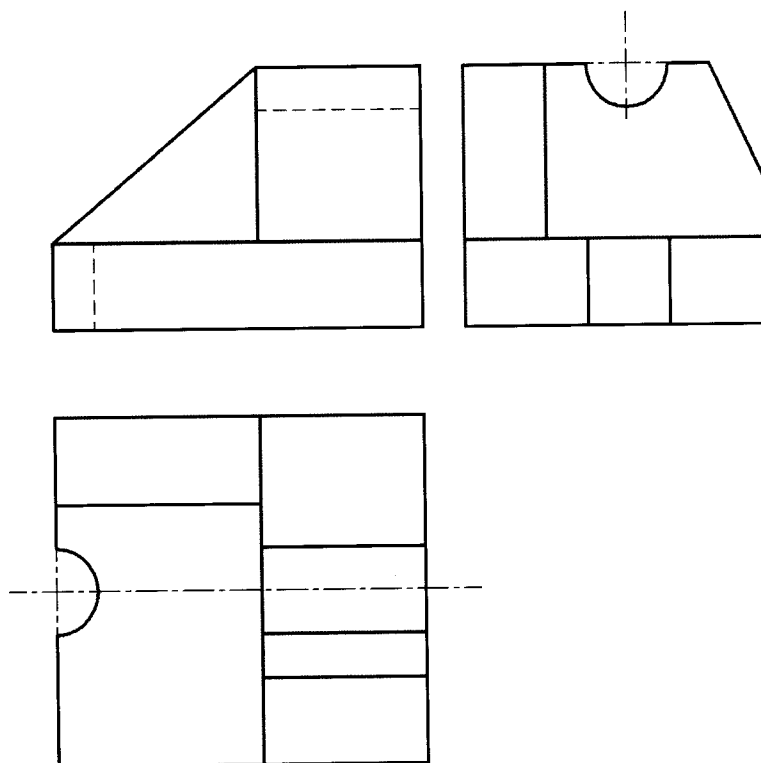
#### Weaknesses

Most candidates could not lay out the views in the correct positions given the angle of projection.

#### Advice to Teachers

Teachers should teach the whole syllabus including related drawing and especially orthographic and isometric projection. There is need to clarify the difference between first angle and third angle projection when making orthographic projections with many examples.

**Expected response**



**Question 15**

- (a) Explain how the cutting point on an ordinary lathe tool bit is ground to allow for efficient cutting.
- (b) Give four classifications of lathe tools.

**Weaknesses**

Very few candidates answered this question and they seemed not to be very familiar with it.

**Advice to Teachers**

Teachers should teach all topics including the lathe and the tools used on the same.

**Expected response**

- (a)
  - (i) Grind the end to obtain front clearance
  - (ii) Grind the side clearance
  - (iii) Grind the top rake angle
  - (iv) Round off the cutting tip to obtain a keen edge

(4 x 1/2) = 2 marks

- (b)
- (i) Solid tools (one piece) of H.S.S gripped directly in the tool post
  - (ii) Tool bits of H.S.S. and of square sections held in tool holders
  - (iii) Tipped lathe tools of various kinds
  - (iv) Special tools e.g. boring tools

(4 x 1) =4 marks

### 3.3.2 Metal Work Paper 2 (445/2)

Like in the previous years, the council designed a suitable project for this level together with a comprehensive marking scheme. The subject teacher used the working drawings to supervise the fabrication of the project and the scoring guide to mark the candidate's projects. The marks were then uploaded onto the KNEC within the specified time as per the instructions given.

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