3.3 METAL WORK (445)

The 2021 KCSE examinations for Metal Work consisted of two papers namely Paper 1 (theory) and Paper 2 (Practical Project). 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.

3.3.1 Candidates General Performance

The table below shows candidates' overall performance for the six-year period, from 2016 to 2021.

Table 9: Candidates overall performance in the years 2016, 2017, 2018, 2019, 2020 and 2021

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2016	1 2 **Overall**	**131**	60 40 **100**	35.36 23.66 **59.02**	11.19 5.67 **15.95**
2017	1 2 **Overall**	**115**	60 40 **100**	34.49 23.04 **57.53**	9.39 4.29 **12.82**
2018	1 2 **Overall**	**156**	60 40 **100**	29.92 20.16 **49.96**	11.2 5.17 **15.65**
2019	1 2 **Overall**	**194**	60 40 **100**	31.92 21.35 **53.26**	11.56 5.37 **15.72**
2020	1 2 **Overall**	**189**	60 40 **100**	36.40 24.25 **60.45**	11.86 5.13 **15.96**
2021	1 2 **Overall**	**218**	60 40 **100**	35.48 23.62 **58.83**	12.50 5.86 **17.58**

The following observations can be made from the above table:

(i) The candidature increased from189 in 2020 to 218 in 2021.

(ii) However, mean score decreased from 60.45 in the year 2020 to 58.83 in 2021. This is an indication of a drop in performance.

(iii) The standard deviation improved from 15.96 in the year 2020 to 17.58.

3.3.2 Metal Work 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 6(a), 8, 9 and 15(c) and (d).

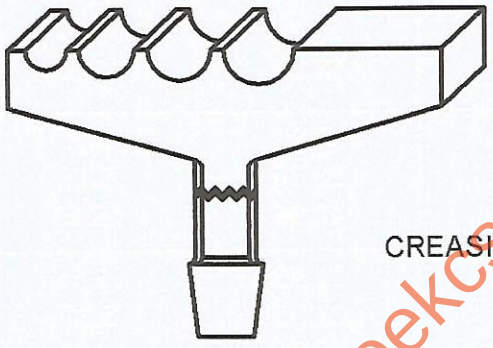
Question 6 (a)

Sketch a creasing iron and give two uses of the iron.

Weaknesses
Most of the candidates could not sketch the creasing iron as per the requirements of the question.

Advice to Teachers
Teacher need to teach holistically including the topic on freehand sketching the tools used in Metalwork.

Expected response
A creasing iron:



CREASING IRON

Uses of a creasing iron
(i) Making angular bends.
(ii) Supports the curved surface when closing the edge.

Question 8

Use sketches to show the effects of each of the following when facing on the lathe
a) Setting the tool too high
b) Setting the tool too low

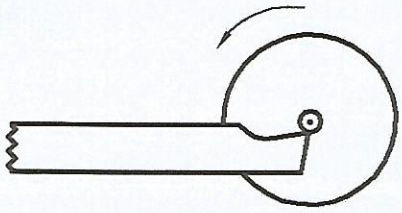
Weaknesses

Most candidates could not sketch to show the effects of setting the tool as indicated in the question.

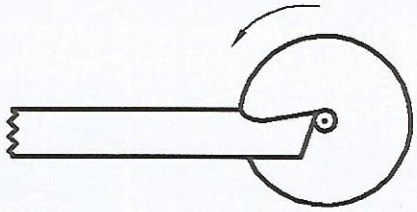
Advice to Teachers

Teachers should explain clearly to the students the effects of not setting the tool to the appropriate position when turning on the lathe.

Expected response



Too low setting
(b)



Too high setting
(a)

In either case, a small pip will be left at the centre of the faced end.

Question 9

Explain each of the following terms as applied in heat treatment of steel:

a) Lower critical point
b) Upper critical point
c) Critical range

Weaknesses

Most candidates could not explain the terms of heat treatment as asked in the question.

Advice to Teachers

Explain to the students all the terms used in the heat treatment of steel.

Expected response

a) Lower critical point is the temperature at which steel starts to change its molecular build up, making it possible to alter the final property.
b) Upper critical point is the point where the molecular change in steel ends (it is the point where critical boundaries of steel start breaking down).
c) Critical range is the temperature between the two critical points.

Question 15 (c)

Sketch to show a grooved punch in use.

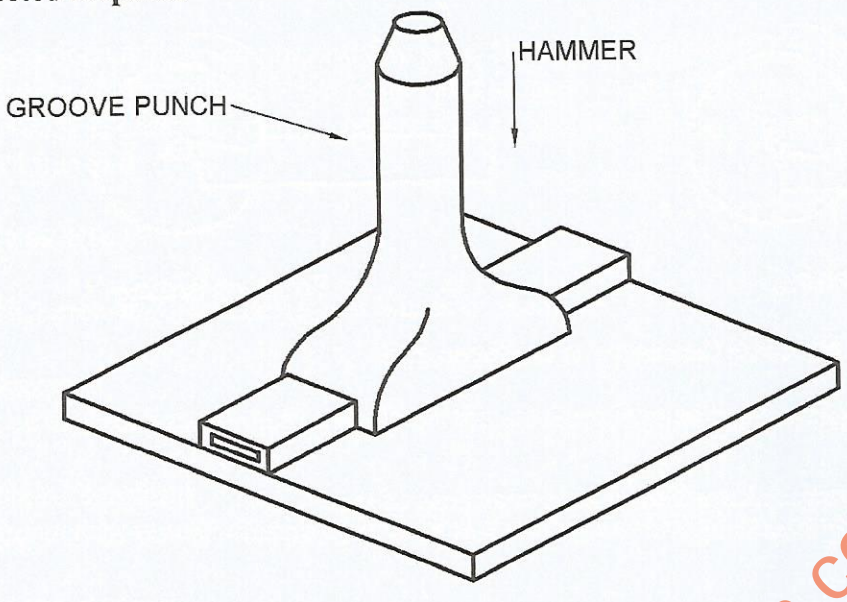
Weaknesses

Most candidates were not able to sketch the grooved punch.

Advice to Teachers

Teachers should teach all topics including processes in sheet metalwork.

Expected response



Question 15 (d)

Outline the procedure of soldering seams to make them water tight.

Weaknesses

Most candidates could not outline the procedure of soldering seams to make them water tight.

Advice to Teachers

Teachers should teach all topics give the students practice in the procedures in metalwork

Expected response

How to solder a seam joint:

i. Clean the area to be soldered
ii. Clean, heat and tin the soldering iron
iii. Apply drops of solder along the edge of the iron
iv. Return to the starting point and solder to the far end and clean the joint

3.3.3 Metal Work Paper 2 (445/2)

Like in the previous years, the council designed a suitable project for this level together with a comprehensive scoring guide. 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 portalwithin the specified time as per the instructions given after revision due to the Covid 2019 pandemic.