

**2005 HSC Notes from
the Marking Centre
Metal and Engineering**

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2005 HSC NOTES FROM THE MARKING CENTRE METAL AND ENGINEERING

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course Metal and Engineering Curriculum Framework. It provides comments with regard to responses to the 2005 Higher School Certificate Examination, indicating the quality of candidate responses, and highlighting the relative strengths and weaknesses of the candidature in each section and each question.

It is essential for this document to be read in conjunction with the relevant syllabus, the 2005 Higher School Certificate examination, the marking guidelines, and other support documents, which have been developed by the Board of Studies to assist in the teaching and learning of Metal and Engineering Curriculum Framework.

Section I

There are 15 multiple-choice questions.

Question	Correct Response
1	C
2	B
3	C
4	C
5	C
6	A
7	D
8	A
9	B
10	A
11	D
12	C
13	D
14	A
15	B

Section II

The questions in this section are short-response items, in parts. All questions are compulsory. Areas examined include:

- MEM2.5C11A – Measure with graduated devices
- MEM2.8C10A – Perform computations
- MEM9.2AA – Interpret technical drawing
- MEM18.1AA – Use hand tools
- MEM18.2AA – Use power tools/hand held operations

Question 16

In this question candidates were required to answer a series of questions interpreting aspects relating to drawings of a Jack Screw.

- (a) Most candidates correctly identified the material as ‘Cast Iron’ or used the abbreviation ‘CI’.
- (b) Candidates who understood the concept of clearance indicated that the required response was 0.5mm.
- (c) Responses to this question varied and many candidates had difficulty interpreting the features of the drawing. Better responses recognised and allowed for the counterbore in their calculations.
- (d) When calculating the minimum gap in which the Jack Screw would work, the better responses identified the length of the double screw as the limiting factor when all components were assembled.
- (e) Candidates who made use of the formula ‘Tapping drill size = OD – pitch’ were able to access the marks available for this question.
- (f) Most candidates related the rotation of the left and right handed threads to an increase or decrease in the height of the Jack Screw.
- (g) Most candidates were able to provide at least one acceptable reason for having a drawing standard. Better responses were able to articulate details of two or three acceptable reasons.

Question 17

This question required candidates to read dimensions from a drawing and substitute them into a simple formula and then perform a computation.

This question was generally answered well by most candidates. Better responses used the formula correctly, calculating the length of the taper as 60mm, and then completing the computation accurately.

Question 18

This question required the candidates to identify tolerance distribution and make some calculations to complete the table.

- (a) The concept of tolerance distribution was not understood by many candidates. Tolerance may be distributed either both sides of the basic size bilateral or on one side only of the basic size unilateral.
- (b) Most candidates were able to calculate the upper and lower limits of the diameter.

Question 19

This question dealt with reading and setting a set of vernier calipers.

- (a) Candidates generally showed a lack of knowledge about the accuracy of vernier scales. Most candidates incorrectly indicated an accuracy of 0.01 for the scale shown.
- (b) Most of the candidates demonstrated the ability to read the vernier scales in the diagram.
- (c) Many candidates were able to provide a logical sequence of steps to set the vernier caliper to the measurement required. Better responses were able to identify the importance of tightening the fine adjusting locking screw before making the final fine adjustment of the vernier scale.

Question 20

This question related to the use of hand tools, in particular with reference to files and filing, types of files, cross-sectional shape and file features.

Candidates exhibited inconsistent knowledge of a versatile hand tool.

- (a) The term ‘pinning’ caused some confusion, although most candidates were able to offer suggestions as to how to minimise pinning by using chalk, cleaning the file regularly or initially choosing the most suitable file for a particular metal.
- (b) Responses to this question indicated that many candidates were familiar with the common file cross sectional shapes indicated.
- (c) Many candidates were unable to fully explain the file related terminology required in this question.

Section III

The questions in this section are extended response items. Candidates attempt two questions, each with a value of 15 marks.

Question 21

This question required the candidates to propose a ‘Job Plan’, using their knowledge of hand and power tools and hand-held operations to set out a safe and efficient sequence of steps to manufacture the plate.

This question was attempted by half the number of candidates.

The candidates’ responses covered the full range of marks available with marks being awarded for sequence and tools and equipment used.

As stated, the question required a Job Plan, however most candidates answered in an essay format.

Better responses by candidates were well written, specific and indicated a good knowledge of the sequence of steps to produce the plate. A precise use of specific industry terminology allowed access to the higher range of marks awarded. However, some of the candidates missed important steps and information such as datum edges.

Some responses lacked coverage and failed to indicate a logical sequence of steps to produce the plate. These responses dealt with the marking out in detail but failed to mention the full spectrum of steps required, or mentioned inappropriate tools/equipment or steps.

Question 22

This question required candidates to discuss how the introduction of technologies has changed engineering workplaces in relation to workplace practices, the production of quality products and the reduction of costs, using appropriate workplace examples.

Candidates responses covered the full range of marks available, with marks being awarded on the basis of candidates indicating the change and supporting this change with workplace example(s).

Better responses by candidates gave several examples of change supported by workplace examples for each of the three question areas.

Mid-range responses nominated a range of implications from the introduction of new technologies but failed to expand their answer with workplace examples. Some responses mentioned machines replacing workers as machines are faster and more accurate, but failed to give any workplace examples to support their statements.

Question 23

This question proved the most popular question in Section III.

In the question the candidates were required to explain the intended effect of a sign on people involved in a work place, as well as its impact on the organisation of tools, equipment and materials. The responses covered the full range of marks available as set out in the marking guidelines.

Better responses explored and reflected on the effect of the sign on the employer and employees, relating it to the effective management of tools, equipment and materials. These responses then examined the impact of such industrial housekeeping on safety, reduction of injuries, economy of materials use, improved quality and processing.

A key discriminating factor in all the better responses was candidate's ability to construct a well reasoned and logical explanation using appropriate language and industrial terms.

Many of the candidates who accessed mid-range marks outlined the responsibilities of employees and, to a lesser extent, employer regarding industrial housekeeping. These responses were framed in general terms and focused mainly on the sign's potential to improve safety standards in the workshop. Many of these candidates supported their general explanation with relevant school or work placement examples.

Some responses to this question indicated a very basic understanding if the sign's meaning. They were often poorly constructed and a very general rewording of the sign. Some listed a few examples but failed to relate them to the sign and provided little or no evidence of the benefits of industrial housekeeping.

Metal and Engineering

2005 HSC Examination Mapping Grid

Question	Marks	Unit of competency/Element of competency	
Section I			
1	1	MEM2.5C11A	Measure with graduated devices
2	1	MEM2.5C11A	Measure with graduated devices
3	1		Industry Induction
4	1	MEM1.1FA	Workplace communication
5	1	MEM2.8C10A	Perform computations
6	1	MEM2.8C10A MEM2.5C11A	Perform computations Measure with graduated devices
7	1	MEM1.2FA	Apply principles of OHS in the work environment, Industry Induction
8	1	MEM1.2FA	Apply principles of OHS in the work environment, Industry Induction
9	1	MEM2.8C10A MEM2.5C11A	Perform computations Measure with graduated devices
10	1		Industry Induction
11	1	MEM1.3FA	Apply quality procedures
12	1	MEM1.2FA	Apply principles of OHS in the work environment
13	1	MEM1.2FA	Apply principles of OHS in the work environment
14	1	MEM18.2A MEM2.1C12A	Power tools Apply quality systems
15	1	MEM1.3FA	Apply quality procedures
Section II			
16 (a)	1	MEM9.2AA	Interpret technical drawing
16 (b)	1	MEM9.2AA	Interpret technical drawing
16 (c)	2	MEM9.2AA	Interpret technical drawing
16 (d)	2	MEM9.2AA	Interpret technical drawing
16 (e)	2	MEM2.8C10A	Perform computations
16 (f)	2	MEM9.2AA	Interpret technical drawing
16 (g)	3	MEM9.2AA MEM1.1FA	Interpret technical drawing Workplace communication

Question	Marks	Unit of competency/Element of competency	
17	3	MEM2.8C10A MEM9.2AA	Perform computations Interpret technical drawing
18 (a)	1	MEM9.2AA MEM1.3FA	Interpret technical drawing Apply quality procedures
18 (b)	3	MEM9.2AA MEM1.3FA	Interpret technical drawing Apply quality procedures
19 (a)	1	MEM2.5C11A	Measure with graduated devices
19 (b)	2	MEM2.5C11A	Measure with graduated devices
19 (c)	3	MEM2.5C11A	Measure with graduated devices
20 (a)	2	MEM18.1AB	Use hand tools
20 (b)	3	MEM18.1AB	Use hand tools
20 (c)	4	MEM18.1AB	Use hand tools
Section III			
21	15	MEM1.4FA	Plan to undertake a routine task
22	15		Industry Induction
23	15	MEM1.2FA	Apply principles of OHS in the work environment

2005 HSC Metal and Engineering Marking Guidelines

Section II

Question 16 (a)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
• Correctly states material	1

Question 16 (b)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
• Correctly states clearance	1

Question 16 (c)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
• Correctly calculates internal thread length	2
• Makes some progress toward calculating the internal thread length	1

Question 16 (d)*Competencies assessed: MEM9.2AA***MARKING GUIDELINES**

Criteria	Marks
• Correctly calculates the minimum gap	2
• Calculates the minimum gap that includes the relief as a functional measurement	1

Question 16 (e)*Competencies assessed: MEM2.8C10A***MARKING GUIDELINES**

Criteria	Marks
• Correctly calculates drill size using correct data, showing working	2
• Correct answer only, and/or correct answer based on incorrect data	1

Question 16 (f)*Competencies assessed: MEM9.2AA***MARKING GUIDELINES**

Criteria	Marks
• Provides a logical and correct explanation of the Jack Screw action	2
• Provides a generalised explanation	1

Question 16 (g)*Competencies assessed: MEM9.2AA, MEM1.1FA***MARKING GUIDELINES**

Criteria	Marks
• States three acceptable reasons	3
• States two acceptable reasons	2
• States one acceptable reason	1

Question 17*Competencies assessed: MEM2.8C10A, MEM9.2AA***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly calculates taper with evidence of correct substitutions and working	3
<ul style="list-style-type: none">• Attempts to calculate the taper, with an incorrect answer resulting from minor arithmetic error or incorrect substitution of one variable OR <ul style="list-style-type: none">• Gives the correct answer with inadequate working	2
<ul style="list-style-type: none">• Attempts the calculation with a least one value correctly substituted	1

Question 18 (a)*Competencies assessed: MEM9.2AA, MEM1.3FA***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly names the tolerance	1

Question 18 (b)*Competencies assessed: MEM9.2AA, MEM1.3FA***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Gives both upper and lower limits and correctly calculates the tolerance	3
<ul style="list-style-type: none">• Gives both the upper and lower limit OR calculates the tolerance based on incorrect limits	2
<ul style="list-style-type: none">• Gives either the correct upper or lower limit	1

Question 19 (a)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• States the correct maximum accuracy	1

Question 19 (b)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• Correctly reads the vernier	2
• Reads the vernier to within one division of the correct answer	1

Question 19 (c)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• Provides a logical and correct sequence of steps in order to set the vernier callipers	3
• Provides an incomplete sequence of steps to set the vernier callipers	2
• Provides a limited description of the setting process	1

Question 20 (a)*Competencies assessed: MEM18.1AB***MARKING GUIDELINES**

Criteria	Marks
• Correctly identifies process and gives ONE appropriate minimisation method	2
• Correctly identifies process OR • Gives ONE appropriate minimisation method	1

Question 20 (b)*Competencies assessed: MEM18.1AB***MARKING GUIDELINES**

Criteria	Marks
• Names 5 or 6 appropriate files to produce the shapes indicated	3
• Names 3 or 4 appropriate files to produce the shapes indicated	2
• Names 1 or 2 appropriate files to produce the shapes indicated	1

Question 20 (c)*Competencies assessed: MEM18.1AB***MARKING GUIDELINES**

Criteria	Marks
• Completes the table explaining ALL the aspects of length and type of file and file description and grade of cut	4
• Completes the table explaining three of the aspects of length and/or type of file and/or file description and/or grade of cut	3
• Completes the table explaining two of the aspects of length and/or type of file and/or file description and/or grade of cut	2
• Completes the table explaining an aspect of length or type of file or file description or grade of cut	1

Section III

Question 21

Competencies assessed: MEM1.4FA

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Communicates the details of a suitable job plan using precise industry terminology Applies in-depth knowledge and understanding of procedures required to produce the plate Demonstrates an extensive understanding and knowledge of tools and equipment required to produce the plate 	13–15
<ul style="list-style-type: none"> Communicates the details of a suitable job plan using detailed industry terminology Applies a thorough knowledge and understanding of procedures required to produce the plate Demonstrates a specific understanding and knowledge of tools and equipment required to produce the plate 	10–12
<ul style="list-style-type: none"> Communicates the details of a suitable job plan using general industry terminology Applies a sound knowledge and understanding of procedures required to produce the plate Demonstrates an appropriate understanding and knowledge of tools and/or equipment required to produce the plate 	7–9
<ul style="list-style-type: none"> Communicates the details of a suitable job plan using basic industry terminology Applies limited knowledge and understanding of procedures required to produce the plate Demonstrates a general understanding and knowledge of tools and/or equipment required to produce the plate 	4–6
<ul style="list-style-type: none"> Communicates some aspects of a job plan using non-specific industry terminology Applies superficial knowledge and understanding to the procedures required to produce the plate Demonstrates an elementary understanding and knowledge of tools and/or equipment required to produce the plate 	1–3

Question 22

Competencies assessed:

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Communicates and analyses details of new technologies using precise industry terminology • Provides an extensive range of new technologies used and their impact on the industry • Demonstrates in-depth understanding and knowledge of the impact new technologies have on product quality, reduction of cost and workplace practice 	13–15
<ul style="list-style-type: none"> • Communicates and analyses details of new technologies using detailed industry terminology • Provides a thorough range of new technologies used and their impact on the industry • Demonstrates specific understanding and knowledge of the impact new technologies have on product quality, reduction of cost and workplace practice 	10–12
<ul style="list-style-type: none"> • Communicates and analyses details of new technologies using general industry terminology • Provides some examples of new technologies used and/or their impact on the industry • Demonstrates appropriate understanding and knowledge of the impact new technologies have on product quality or reduction of cost and/or workplace practice 	7–9
<ul style="list-style-type: none"> • Communicates and analyses some details of new technologies using basic industry terminology • Provides a limited range of new technologies used and/or their impact on the industry • Demonstrates a general understanding and knowledge of the impact new technologies have on product quality or reduction of costs or workplace practice 	4–6
<ul style="list-style-type: none"> • Communicates and analyses some details of new technologies using non-specific industry terminology • Lists some new technologies • Demonstrates an elementary understanding and knowledge of the impact new technologies have on product quality or reduction of costs or workplace practice 	1–3

Question 23
Competencies assessed: MEM1.2FA
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Communicates the meaning of the sign using precise industry terminology • The effect the sign should have on employers and employees is discussed at an in-depth level • Demonstrates an extensive understanding of safe working practices in regard to tool, equipment and material storage 	13–15
<ul style="list-style-type: none"> • Communicates the meaning of the sign using detailed industry terminology • The effect the sign should have on employers and employees is discussed at a thorough level • Demonstrates a specific understanding of safe working practices in regard to tool, equipment and material storage 	10–12
<ul style="list-style-type: none"> • Communicates the meaning of the sign using general industry terminology • The effect the sign should have on employers or employees is discussed in a sound way • Demonstrates an appropriate understanding of safe working practices in regard to tool, equipment and material storage 	7–9
<ul style="list-style-type: none"> • Communicates the meaning of the sign using basic industry terminology • The effect the sign should have on employers or employees is discussed at a limited level • Demonstrates a general understanding of safe working practices in regard to tool, equipment and material storage 	4–6
<ul style="list-style-type: none"> • Communicates the meaning of the sign using non-specific industry terminology • The effect the sign should have on employers or employees is discussed superficially • Demonstrates little understanding of safe working practices in regard to tool, equipment and material storage 	1–3