

**2006 HSC Notes from
the Marking Centre
Metal and Engineering**

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2006 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 2006 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 2006 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

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

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

This question involved an analysis of the drawing of the CASTER.

- (a) Candidates generally answered this question well, adding the 75mm distance to the wheel radius of 50mm to achieve the sum of 125mm.
- (b) The majority of candidates correctly identified 'R' as radius.
- (c) Most candidates were able to identify the symbol as a welding symbol. Many were able to give a more detailed description such as 'weld both sides', although only the better responses offered a full description of 'fillet weld both sides 6mm size'.
- (d) This question was not well answered, with a significant proportion of weaker responses demonstrating a poor knowledge of thread terminology.
- (e) Most candidates were able to complete a satisfactory calculation for the material needed. Weaker responses offered a diverse range of answers.
- (f) This section was well answered by the majority of candidates.
- (g) Most candidates offered a sound description for the purpose of the drawing, but only the better responses provided a correct name for the drawing.

Question 17

- (a) Candidates answered this question well, readily identifying the accuracy of the rule.
- (b) The majority of candidates provided a sound description of an example of poor practice in handling the engineer's rule and also a consequence of this poor practice.
- (c) Many candidates answered this question well, displaying a sound understanding of the method for determining the reading of a micrometer. Others provided a correct answer and calculation, misplacing the readings in the table. A significant number recorded the thimble reading as 27, not 0.27, but still made a correct calculation.

Question 18

This question involved an analysis of the drawing of the SIDE PLATE and a suitable method of construction.

- (a) Candidates were asked to comment on two different aspects: an existing and a revised production plan for the plate. Weaker responses did not make reference to both parts in their answers, often focusing on one or the other.
- (b) Candidates often did not recognise that the question referred to production in large numbers. Poorer responses referred to methods that might be employed if making small numbers in a school workshop. Better responses made reference to the use of jigs for manufacturing, templates, periodic withdrawal of samples from the production line, and the use of computerised technology in the manufacturing process.

Question 19

This question referred to hand tools.

- (a) The majority of candidates had a good understanding of a sound procedure, or parts of a procedure for managing defective tools. A significant number fully answered the question by indicating the most appropriate procedure of removing the tool from service, reporting the fault, and the repair or replacement of the tool. Many wrote of tagging defective tools and recording in a shop log.
- (b) This question was well answered. Candidates readily recognised the hand tools pictured and were able to describe their safe and appropriate use.

Section III

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

Question 20

This question required candidates to recommend a sequence of steps to manufacture a cover plate. Within the sequence candidates were asked to consider aspects of tool selection and safe use to ensure a quality product.

In general, most candidates could identify a sequence of production steps; however, the detail concerning tools and quality varied.

Better responses presented a detailed sequence using precise industry terminology. Tools were correctly named and their application clearly described along with appropriate safety concerns. These responses considered aspects of quality during the entire manufacturing sequence, rather than at the end.

Many good responses were tabulated or integrated tools, safety and quality into the context of each production step. In some cases, these responses were aided by neat, relevant diagrams.

Poorer responses lacked depth and concentrated on the marking out phases of the manufacture. A well reasoned and cohesive response detailed a suitable sequence that included preparation, marking out, shaping and finishing.

A separate list of tools, or safety issues, together with a brief or partially correct sequence was evident in poorer responses. These responses failed to address areas of the rubric included at the beginning of Section III.

Question 21

This question asked the candidates to assess the place of personal protective equipment (PPE) in the metal and engineering industry, and specifically the role of PPE in reducing costs to industry. Many candidates focused on examples of PPE and described their correct use in an industrial setting. A significant number of candidates did not include any discussion of cost benefits. Many candidates mentioned cost benefits in very general terms, or only briefly. A common argument repeated by many candidates suggested that PPE helps prevent accidents, and as injuries are reduced, so costs are reduced. No specific mention of how or what costs, were reduced was offered by many candidates. A smaller number of candidates gave a satisfactory description of PPE and its use, and included in their responses a range of financial costs incurred by both employers and employees. Mid-range responses concentrated on the direct financial costs only for all parties concerned. Non-financial costs, career or lifestyle implications, were mentioned by fewer candidates and typically were restricted to higher range answers.

All candidates demonstrated at least a basic understanding of PPE and its role in industry.

Question 22

This question provided the candidates the opportunity to demonstrate their knowledge and understanding of hazard management in a metal and engineering workshop. Candidates were required to refer to the risk assessment tool provided, the hierarchy of hazard control, safe working practices and OHS training to aid in their response.

The better responses clearly identified a management process – inspect, identify and manage. They then linked these concepts with the hazard assessment table. These responses incorporated all areas of the question and displayed the ability to clearly articulate their thoughts.

Many candidates responded in a general way and provided examples of hazards and possible preventative measures. While briefly mentioning elimination and/or substitution as a management technique, some candidates failed to expand their response to incorporate all parts of the question.

Poorer responses failed to communicate ideas and information adequately. The responses lacked organisation and/or included irrelevant material.

Metal and Engineering

2006 HSC Examination Mapping Grid

Question	Marks	Unit of competency / Element of competency
Section I		
1	1	MEM18.1AB / Use hand tools
2	1	MEM18.2AA / Use power tools/hand held operations
3	1	MEM2.1C12A / Apply quality systems
4	1	MEM1.2FA / Apply principles of OHS in work environment
5	1	MEM18.2AA / Use power tools/hand held operations
6	1	MEM18.1AB / Use hand tools
7	1	MEM1.3FA / Apply quality procedures
8	1	MEM1.2FA / Apply principles of OHS in work environment
9	1	MEM18.1AB / Use hand tools
10	1	MEM18.2AA / Use power tools/hand held operations
11	1	MEM1.1FA / Undertake interactive workplace communication
12	1	MEM2.5C11A / Measure with graduated devices MEM2.1C12A / Apply quality systems
13	1	MEM1.3FA / Apply quality procedures
14	1	Manufacturing and engineering industry induction
15	1	MEM1.1FA / Undertake interactive workplace communication
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 / Interpret technical drawing
17 (a)	1	MEM2.5C11A / Measure with graduated devices
17 (b)	2	MEM2.5C11A / Measure with graduated devices
17 (c)	3	MEM2.5C11A / Measure with graduated devices
18 (a)	4	MEM1.4A / Plan to undertake a routine task
18 (b)	3	MEM1.3FA / Apply quality procedures
19 (a)	3	MEM18.1AB / Use hand tools
19 (b)	6	MEM18.1AB / Use hand tools
Section III		
20	15	MEM1.4FA / Plan to undertake a routine task
21	15	MEM1.2FA / Apply principles of OHS in the work environment
22	15	Manufacturing and Engineering industry induction

2006 HSC Metal and Engineering Marking Guidelines

Section II

Question 16 (a)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Correctly calculates the overall height of the caster 	1

Question 16 (b)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Correctly interprets R as referring to Radius 	1

Question 16 (c)

Competencies assessed: MEM9.2AA

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Fully explains the meaning of the symbol 	2
<ul style="list-style-type: none"> Indicates the symbol is a welding symbol 	1

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

Criteria	Marks
• Correctly explains both M and 1.5	2
• Correctly explains either one of M or 1.5	1

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

Criteria	Marks
• Correctly calculates material length 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
• Completes table with FOUR correct responses	2
• Completes table with TWO correct responses	1

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

Criteria	Marks
• Provides a correct name and provides an explanation of the drawing's function	3
• Provides correct name only OR an explanation of the drawing's function	2
• Provides an incomplete name OR poor explanation of the drawing's function	1

Question 17 (a)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• Correctly indicates accuracy as 1 mm	1

Question 17 (b)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• Indicates a result and a related effect	2
• Indicates a result or related effect	1

Question 17 (c)*Competencies assessed: MEM2.5C11A***MARKING GUIDELINES**

Criteria	Marks
• Correctly enters the readings required and correctly calculates the total	3
• Substantially correct response	2
• Shows some understanding of the use of a micrometer	1

Question 18 (a)*Competencies assessed: MEM1.4A***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Identifies a series of problems and suggests a logical and correct production sequence	4
<ul style="list-style-type: none">Identifies a problem and suggests a logical and correct production sequence OR <ul style="list-style-type: none">Identifies a series of problems and suggests a partially correct production sequence	3
<ul style="list-style-type: none">Identifies a series of problems OR <ul style="list-style-type: none">Suggests a logical and correct production sequence	2
<ul style="list-style-type: none">Identifies a problem OR <ul style="list-style-type: none">Suggests a partially correct production sequence	1

Question 18 (b)*Competencies assessed: MEM1.3FA***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides a sound description of more than one 'quality' technique	3
<ul style="list-style-type: none">Provides an adequate description of more than one 'quality' technique OR a good description a 'quality' technique.	2
<ul style="list-style-type: none">States a potential 'quality' technique	1

Question 19 (a)*Competencies assessed: MEM18.1AB***MARKING GUIDELINES**

Criteria	Marks
• Provides a procedure that logically and effectively manages defective hand tools	3
• Outlines key points regarding defective hand tools	2
• Lists some aspects of managing defective hand tools	1

Question 19 (b)*Competencies assessed: MEM18.1AB***MARKING GUIDELINES**

Criteria	Marks
• Correctly identifies SIX responses for the name, application and safety precautions	6
• Correctly identifies FIVE responses for the name, application and safety precautions	5
• Correctly identifies FOUR responses for the name, application and safety precautions	4
• Correctly identifies THREE responses for the name, application and safety precautions	3
• Correctly identifies TWO responses for the name, application and safety precautions	2
• Correctly identifies ONE response for the name, application and safety precaution	1

Section III

Question 20

Competencies assessed: MEM1.4FA

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Communicates the details of a suitable sequence of steps using precise industry terminology in a well-reasoned and cohesive response Applies in-depth knowledge and understanding of the tools and equipment required to produce the Cover Plate Demonstrates an extensive understanding and knowledge of the safe use of tools and the application of quality procedures required to produce the Cover Plate 	13–15
<ul style="list-style-type: none"> Communicates the details of a suitable sequence of steps using detailed industry terminology Applies thorough knowledge and understanding of the tools and equipment required to produce the Cover Plate in a clear and organised response Demonstrates a specific understanding and knowledge of the safe use of tools and the application of quality procedures required to produce the Cover Plate 	10–12
<ul style="list-style-type: none"> Communicates the details of a suitable sequence of steps using general industry terminology Applies sound knowledge and understanding of the tools and equipment required to produce the Cover Plate in a substantially well-reasoned and organized response Demonstrates an appropriate understanding and knowledge of the safe use of tools and the application of quality procedures required to produce the Cover Plate 	7–9
<ul style="list-style-type: none"> Communicates the details of a possible sequence of steps using basic industry terminology Applies limited knowledge and understanding of the tools and equipment required to produce the Cover Plate with some organization evident in the response Demonstrates some understanding and knowledge of the safe use of tools and or the application of quality procedures required to produce the Cover Plate 	4–6
<ul style="list-style-type: none"> Communicates some sequenced steps using non-specific industry terminology with little evidence of reasoning or cohesion in response Applies superficial knowledge and understanding of the tools and equipment required to produce the Cover Plate Demonstrates a limited understanding and knowledge of the safe use of tools and/or the application of quality procedures required to produce the Cover Plate 	1–3

Question 21
Competencies assessed: MEM1.2FA
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Using precise industry terminology, demonstrates an in-depth understanding and knowledge of PPE and its application in the Metal and Engineering industry • Provides an extensive assessment of the cost of injuries to the employer as a result of employee failure to wear PPE, in well-reasoned and cohesive response • Demonstrates extensive understanding and knowledge of the range of consequences to the employee resulting from workplace injuries caused by a failure to wear PPE 	13–15
<ul style="list-style-type: none"> • Using specific industry terminology, demonstrates an well developed understanding and knowledge of PPE and its application in the Metal and Engineering industry • Provides a thorough assessment of the cost of injuries to the employer as a result of employee failure to wear PPE, in a clear and organised response • Demonstrates a thorough understanding and knowledge of the range of consequences resulting to the employee from workplace injuries caused by a failure to wear PPE 	10–12
<ul style="list-style-type: none"> • Using general industry terminology, demonstrates an sound understanding and knowledge of PPE and its application in the Metal and Engineering industry • Provides a limited assessment of the cost of injuries to the employer as a result of employee failure to wear PPE in a substantially well-reasoned and organised response • Demonstrates a limited understanding and knowledge of the range of consequences resulting to the employee from workplace injuries caused by a failure to wear PPE 	7–9
<ul style="list-style-type: none"> • Using some industry terminology, demonstrates a basic understanding and knowledge of PPE and its application in the Metal and Engineering industry • Provides little or no assessment of the cost of injuries to the employer as a result of employee failure to wear PPE with some organisation evident in the response • Demonstrates a minimal understanding and knowledge of the range of consequences resulting to the employee from workplace injuries caused by a failure to wear PPE 	4–6
<ul style="list-style-type: none"> • Using non-specific industry terminology, lists some PPE and its application in the Metal and Engineering industry with little evidence of reasoning or cohesion in response • Provides little or no assessment of the cost of injuries to the employer as a result of employee failure to wear PPE • Demonstrates little or no understanding and knowledge of the range of consequences resulting to the employee from workplace injuries caused by a failure to wear PPE 	1–3

Question 22

Competencies assessed: Industry induction

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Demonstrates an extensive understanding and knowledge of the management of hazards in a Metal and Engineering workplace • Explains at an in-depth level the risk assessment tool and its implications for the control of hazards, in a well-reasoned and cohesive response • Communicates, using precise industry terminology, the importance of safe working practices and associated training in hazard control 	13–15
<ul style="list-style-type: none"> • Demonstrates an thorough understanding and knowledge of the management of hazards in a Metal and Engineering workplace • Explains at a detailed level the risk assessment tool and its implications for the control of hazards in a clear and organised response • Communicates, using industry terminology, safe working practices and associated training in hazard control 	10–12
<ul style="list-style-type: none"> • Demonstrates an sound understanding and knowledge of the management of hazards in a Metal and Engineering workplace • Explains at a basic level the risk assessment tool and makes some connections with the control of hazards with a substantially well-reasoned and organised response • Communicates, in general terms, some safe working practices and associated training in hazard control 	7–9
<ul style="list-style-type: none"> • Demonstrates an some understanding and knowledge of the management of hazards in a Metal and Engineering workplace • Describes the risk assessment tool and makes some connections with the control of hazards with some organisation evident in the response • Mentions some safe working practices or associated training in hazard control 	4–6
<ul style="list-style-type: none"> • Demonstrates a minimal understanding and knowledge of the management of hazards in a Metal and Engineering workplace • Describes the risk assessment tool with little evidence of reasoning or cohesion in response • Mentions, using non-industry specific terms, some safe working practices or associated training in hazard control 	1–3