BOARD OF STUDIES
NEW SOUTH WALES

2008

HIGHER SCHOOL CERTIFICATE EXAMINATION

Metal and Engineering

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue pen
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9 and 13

Total marks – 80

Section I Pages 2–5

15 marks

- Attempt Questions 1–15
- Allow about 15 minutes for this section

Section II Pages 9–15

35 marks

- Attempt Questions 16–19
- Allow about 45 minutes for this section

Section III Page 17

30 marks

- Attempt TWO questions from Questions 20–22
- Allow about 1 hour for this section

Section I

15 marks
Attempt Questions 1–15
Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1–15.

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1 Which document outlines the correct use of equipment or machinery?

(A) Work schedule

(B) Material safety data sheet

(C) Risk assessment worksheet

(D) Standard operating procedure sheet

2 What portable power tool has a reciprocating cutting action?

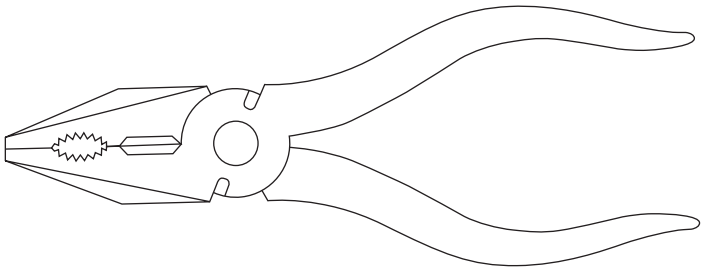
(A) Drill

(B) Router

(C) Jigsaw

(D) Angle grinder

3 What type of tool is shown?



(A) Cutting pliers

(B) Multi-grip pliers

(C) Long nosed pliers

(D) Combination pliers

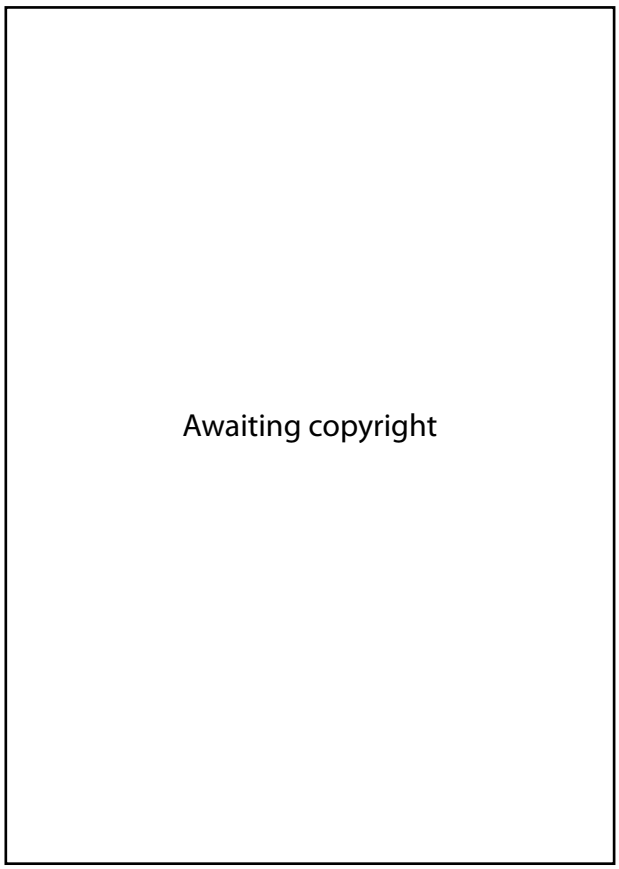
4 Which set of safety signs would be the most appropriate to display in an area designated for angle grinding?

(A)

(B)

(C)

(D)



5 Round off a micrometer reading of 23.25 correct to one decimal place.

(A) 23.0

(B) 23.2

(C) 23.3

(D) 23.5

6 What tool should be used to start cutting an internal thread?

(A) Split die

(B) Taper tap

(C) Button die

(D) Intermediate tap

7 An angle grinder has developed a severe vibration while being used.

What is the most likely cause of this vibration?

(A) A loose safety guard

(B) Damage to the grinding disk

(C) Damage to the electrical lead

(D) Using an incorrect grinding disk

8 What should be the first step in calibrating or zeroing a micrometer?

(A) Clean the faces of the anvil and spindle

(B) Ensure the micrometer is at room temperature

(C) Check that all moving parts are well lubricated

(D) Check that the faces of the anvil and spindle will make contact with each other

9 Who is responsible for the funding of Workers Compensation?

(A) Employers

(B) Employees

(C) WorkCover

(D) Trade Unions

10 What type of file has parallel edges with teeth on two faces and one edge?

(A) Flat

(B) Hand

(C) Square

(D) Warding

11 A rectangular tank measures 1.2 metres long, 1 metre wide and 2 metres high.

What is the volume, in litres, of this tank?

(A) 2.4 litres

(B) 24 litres

(C) 240 litres

(D) 2400 litres

12 When working with others, checking and clarifying task-related information is an important skill.

Which term best describes this skill?

(A) Personal

(B) Self-directed

(C) Interpersonal

(D) Organisational

13 In addition to hazard control, which of the following supports a formal systematic approach to reducing injuries in the workplace?

(A) Manual handling

(B) Evacuation procedures

(C) Accident reports and statistics

(D) Personal protective equipment

14 Which of the following contributes to a quality system?

(A) Minimising costs

(B) Controlling product design

(C) Enhancing customer satisfaction

(D) Improving the production process

15 Which strategy would best minimise the negative environmental impacts resulting from production in a metal and engineering workshop?

(A) Making accurate measurements and calculations

(B) Purchasing all necessary raw materials as needed

(C) Using machines during the manufacturing process

(D) Making improvements to metal handling techniques

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Metal and Engineering

Centre Number

Student Number

Section II

35 marks
Attempt Questions 16–19
Allow about 45 minutes for this section

Detach page 20 and use the sketch, CRANK ARM, to answer Questions 16 and 17.

Answer the questions in the spaces provided.

Marks

Question 16 (10 marks)

(a) What angle projection has been used for this sketch? **1**

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(b) In the dimension ∅60 what does the symbol ∅ mean? **1**

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(c) What is the cross-sectional shape of the hole that runs through the centre of the BOSS? **1**

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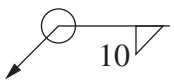
(d) What does this symbol indicate about the features of the weld required to join the BOSS to the ARM? **2**



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Question 16 continues on page 10

Marks

Question 16 (continued)

(e) Calculate the minimum length of 80 mm × 20 mm material required to manufacture one ARM. Show all working. **2**

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(f) What are the advantages of using sketches to communicate technical information in the engineering workshop? **3**

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End of Question 16

Marks

Question 17 (8 marks)

(a) Propose a sequence of steps that could be followed to mark out the external shape of the ARM on 80 mm wide and 20 mm thick material. For each step list the tool(s) required. Only marking out and hand tools are available. **6**

Sequence of steps	*Tool(s) required*

(b) Outline a series of quality checking procedures that would ensure the marking out of the ARM is accurate. **2**

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Centre Number

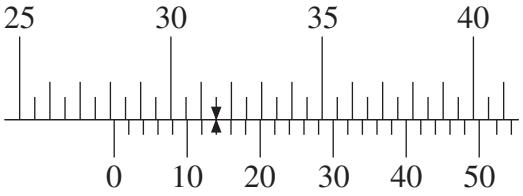
Section II (continued)

Student Number

Marks

Question 18 (10 marks)

(a) Determine the reading on the vernier scale as indicated by the arrows. **1**



Reading ..... mm

(b) Name the marking out tool shown and give one specific application for this tool. **2**

Name: .....

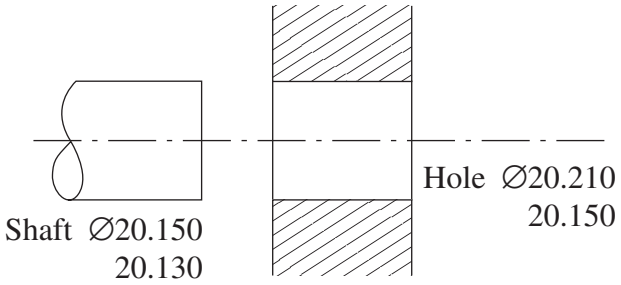
Specific application: .....

Question 18 continues on page 14

Marks

Question 18 (continued)

(c) The dimensions of a shaft and hole are shown.



(i) Calculate the tolerance for the shaft and the hole. **2**

Shaft tolerance: .....

Hole tolerance: .....

(ii) Calculate the maximum possible clearance between the shaft and the hole. Show all working. **2**

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(d) Describe the appropriate methods of caring for and storing measuring devices in a metal and engineering workplace. **3**

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End of Question 18

Marks

Question 19 (7 marks)

(a) Complete the table by naming the portable power tools shown and stating one common application for each tool. **4**

Portable power tool	*Name*	*Application*
Awaiting copyright		
Awaiting copyright		

(b) Outline the pre-operational safety checks that should be carried out on portable electric power tools. **3**

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Metal and Engineering

Section III

30 marks
Attempt TWO questions from Questions 20–22
Allow about 1 hour for this section

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

In your answers you will be assessed on how well you:

- demonstrate relevant knowledge and understanding
- communicate ideas and information, using precise industry terminology and appropriate workplace examples
- organise information in a well-reasoned and cohesive response
- solve proposed issues or problems

Question 20 (15 marks)

Describe a range of practices that can be used to prevent workplace accidents and injuries in a metal and engineering work environment.

Question 21 (15 marks)

Describe strategies that would minimise scrap metal, waste products and environmental hazards resulting from the activities of metal and engineering industries.

Question 22 (15 marks)

Describe the various modes of communication used to receive work instructions when planning to undertake a routine task.

Give examples of where each mode is most appropriate.

End of paper

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Detach this sheet and use the sketch, CRANK ARM, to answer Questions 16 and 17.

Please turn over