



B O A R D O F S T U D I E S
NEW SOUTH WALES

2011

**HIGHER SCHOOL CERTIFICATE
EXAMINATION**

Metal and Engineering

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue pen
Black pen is preferred
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9, 11 and 15

Total marks – 80

Section I Pages 2–6

15 marks

- Attempt Questions 1–15
- Allow about 20 minutes for this section

Section II Pages 9–17

35 marks

- Attempt Questions 16–19
- Allow about 50 minutes for this section

Section III Page 19

15 marks

- Attempt Question 20
- Allow about 25 minutes for this section

Section IV Page 20

15 marks

- Attempt Question 21
- Allow about 25 minutes for this section

Section I

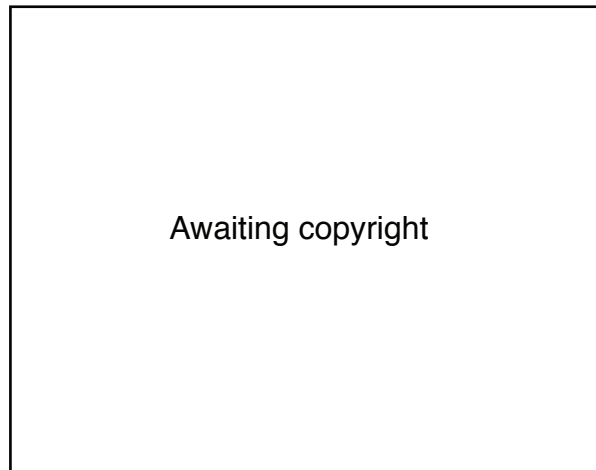
15 marks

Attempt Questions 1–15

Allow about 20 minutes for this section

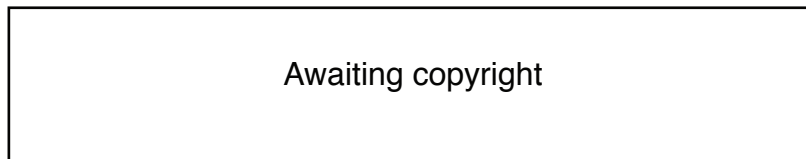
Use the multiple-choice answer sheet for Questions 1–15.

1 What is the name of the marking out tool pictured?



- (A) Compass
- (B) Outside calipers
- (C) Spring dividers
- (D) Trammel

2 What is the name of the process that uses the tool shown?







- (A) Boring
- (B) Drilling
- (C) Countersinking
- (D) Tapping

3 A hand-held hacksaw is to be used to cut $\text{Ø}50 \times 1.0$ mm steel tube.

What hacksaw blade would be the most efficient for this task?

- (A) 14 teeth per 25 mm (1 inch)
- (B) 18 teeth per 25 mm (1 inch)
- (C) 24 teeth per 25 mm (1 inch)
- (D) 32 teeth per 25 mm (1 inch)

4 How is a centre line represented on an engineering drawing?

- (A) 
- (B) 
- (C) 
- (D) 

5 What is the correct conversion of 0.5842 metres into millimetres?

- (A) 0.05842
- (B) 5.842
- (C) 58.42
- (D) 584.2

6 Which type of fire extinguisher should be used to control an electrical fire?

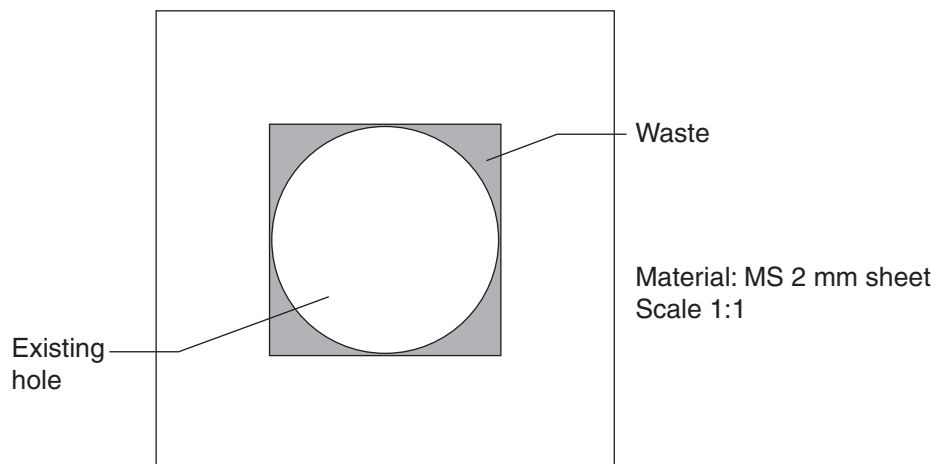
- (A) Foam
- (B) Water
- (C) Wet chemical
- (D) Dry chemical

7 What is the first step in the quality cycle?

_____, Do, Check, Act.

- (A) Buy
- (B) Look
- (C) Plan
- (D) Read

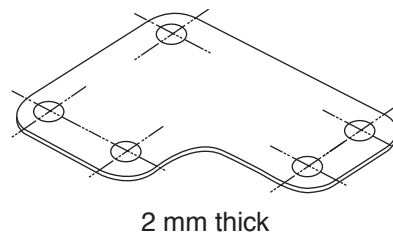
8 A piece of sheet metal is shown.



Which power tool would efficiently and safely remove the waste shown and turn the existing hole into a square shape?

- (A) Angle grinder
 - (B) Jigsaw
 - (C) Nibbler
 - (D) Shears
- 9 If you are required to complete a task and are unsure of the work requirements, what is the best way to proceed?
- (A) Contact the OHS representative.
 - (B) Seek advice from your supervisor.
 - (C) Obtain information from a co-worker.
 - (D) Complete the task by using trial and error.

- 10 What is the minimum number of views required to sketch and fully describe the object below in an orthographic drawing?



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- (A) One
(B) Two
(C) Three
(D) Four
- 11 What class of safety sign features a black symbol on a yellow background in a black triangle?
- (A) Caution
(B) Emergency
(C) Mandatory
(D) Prohibition
- 12 Which of the following is an essential requirement for a flexible career pathway?
- (A) Completing a skills audit
(B) Compiling efficiency reports
(C) Engaging in appropriate learning activities
(D) Creating an improved working environment
- 13 Which of the following must be developed to complete work within a given time frame?
- (A) Job plan
(B) Quality control
(C) Safe work method statement
(D) Standard operating procedures

14 A screw thread is shown. What is the distance X known as?



- (A) Crest
- (B) Pitch
- (C) Root
- (D) Width

15 What is the name of the process where a third party hears arguments from both sides of an industrial dispute, and then makes a legally binding decision?

- (A) Arbitration
- (B) Conciliation
- (C) Mediation
- (D) Reconciliation

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Centre Number

Section II

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Student Number

35 marks

Attempt Questions 16–19

Allow about 50 minutes for this section

Detach page 22, and use Drawing 2011–1, BASE PLATE, to answer Questions 16–17.

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

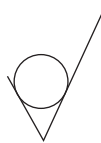
Question 16 (9 marks)

Refer to Drawing 2011–1 to answer parts (a) to (e).

- (a) After boring, what is the minimum size of the hole in the BOSS? 1

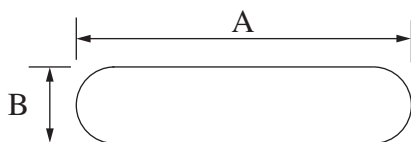
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- (b) Identify the type of symbol found at D2. 1



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- (c) Fill in the following table to show the dimensions of the slot found at both A1 and D1. 2



	Dimension in mm
A	
B	

Question 16 continues on page 10

Question 16 (continued)

- (d) What is the purpose of the additional drawing at C6? 2

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- (e) Name and describe the features of a pictorial drawing an engineer could use to ensure a client clearly understands the general shape and structure of the assembled BASE PLATE. 3

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End of Question 16



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Centre Number

Section II (continued)

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Student Number

Question 17 (9 marks)

Please turn over

Question 17 (9 marks)

- (a) In the table, propose a sequence of steps that could be followed to mark out and manufacture the slot in Item 2 – ANGLE, location A1. For each step list the tools required.

6

<i>Sequence of steps – marking out</i>	<i>Tools</i>
<i>Sequence of steps – manufacture</i>	<i>Tools</i>

Question 17 continues on page 13

Question 17 (continued)

(b) Describe how you would control a potential hazard which may arise when manufacturing the slot in Item 2 – ANGLE, location A1. **3**

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End of Question 17

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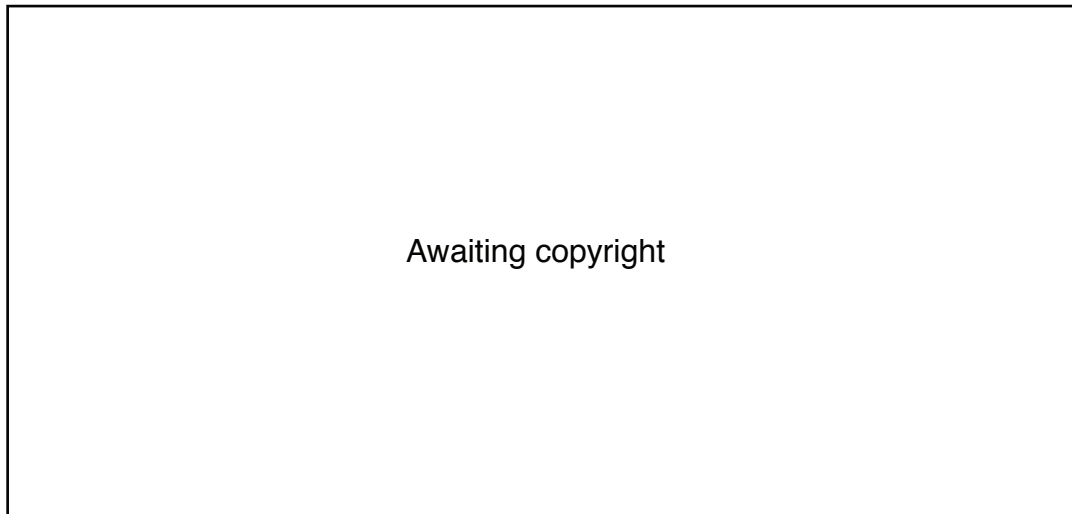
Section II (continued)

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Student Number

Question 18 (8 marks)

Refer to the illustration to answer Question 18.



- (a) What is the name of this graduated measuring device? 1

- (b) What is the reading indicated on the graduated measuring device? 1

- (c) What are the purposes of a ratchet? 2

Question 18 continues on page 16

Question 18 (continued)

- (d) Graduated measuring devices such as the one shown are precision instruments. **4**

Outline practices that ensure the accuracy and long life of precision instruments.

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End of Question 18

Question 19 (9 marks)

(a) List the limitations of cordless hand-held power drills. **2**

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(b) Why is it important to attach a safety tag to a faulty hand-held power drill? **3**

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(c) What needs to be considered in selecting a method of securing a work piece when using a hand-held power drill? **4**

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Section III

15 marks

Attempt Question 20

Allow about 25 minutes for this section

Answer the question in a writing booklet. Extra writing booklets are available.

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

- demonstrate knowledge and understanding relevant to the question
 - communicate ideas and information using relevant workplace examples and industry terminology
 - present a logical and cohesive response
-

Question 20 (15 marks)

Describe how a range of work instructions, workplace policies and standard operating procedures ensure the manufacture of quality products.

Please turn over

Section IV

15 marks

Attempt Question 21

Allow about 25 minutes for this section

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

Question 21 (15 marks)

- (a) Why is occupational health and safety (OHS) in the workplace so important? **2**
- (b) Compare the requirements for establishing OHS committees to those of electing individual OHS representatives. **4**
- (c) Propose a set of industrial housekeeping guidelines to assist employees in maintaining a clean, organised and safe work environment in a metal and engineering workplace. **9**

In developing your guidelines, consider procedures and practices for dealing with:

- machinery and equipment
- stock and materials
- hand tools
- work environment.

End of paper

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Detach this sheet and use Drawing 2011–1 to answer Questions 16–17.

Please turn over

