

2012
**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 9–18

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

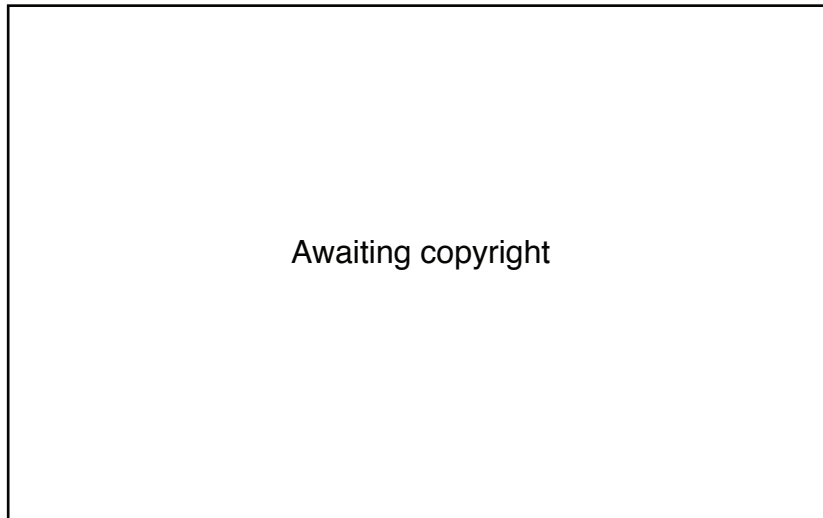
15 marks

Attempt Questions 1–15

Allow about 20 minutes for this section

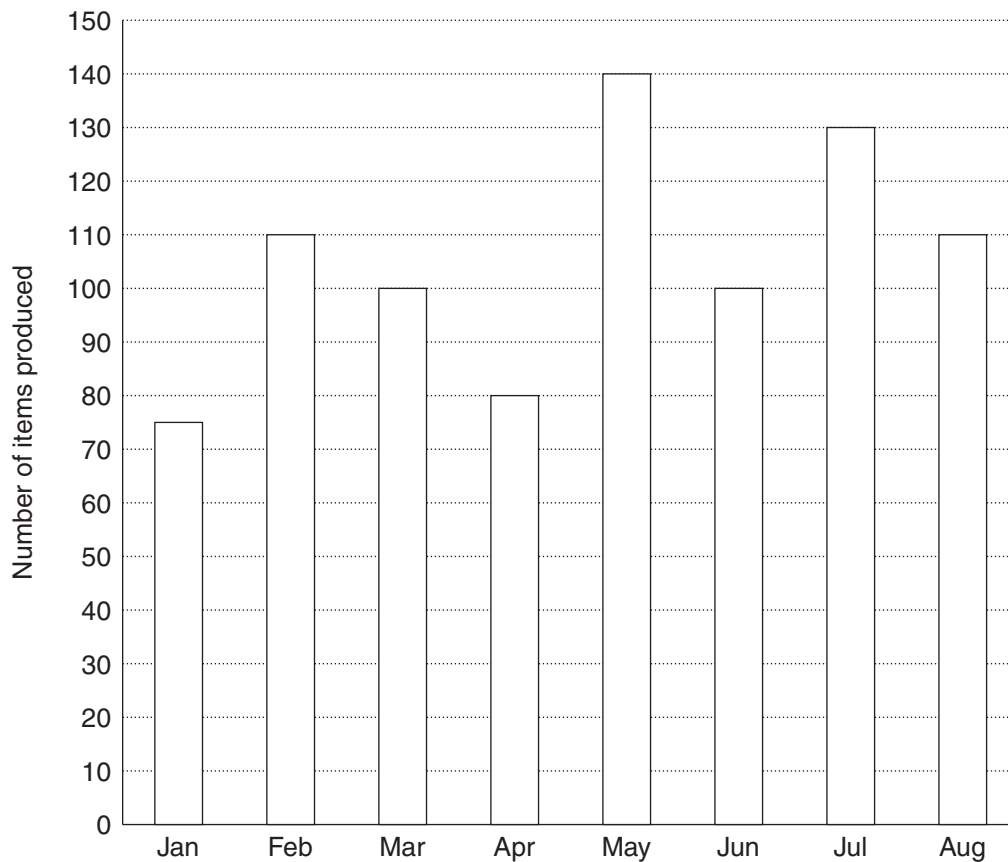
Use the multiple-choice answer sheet for Questions 1–15.

- 1** What is the name of the measuring tool shown?



- (A) Set square
 - (B) Plate square
 - (C) Engineers square
 - (D) Combination square
- 2** Which of the following files would remove material at the fastest rate?
- (A) Smooth
 - (B) Bastard
 - (C) Warding
 - (D) Second cut

- 3 The production graph displays the number of items produced each month from 1 January to 31 August.



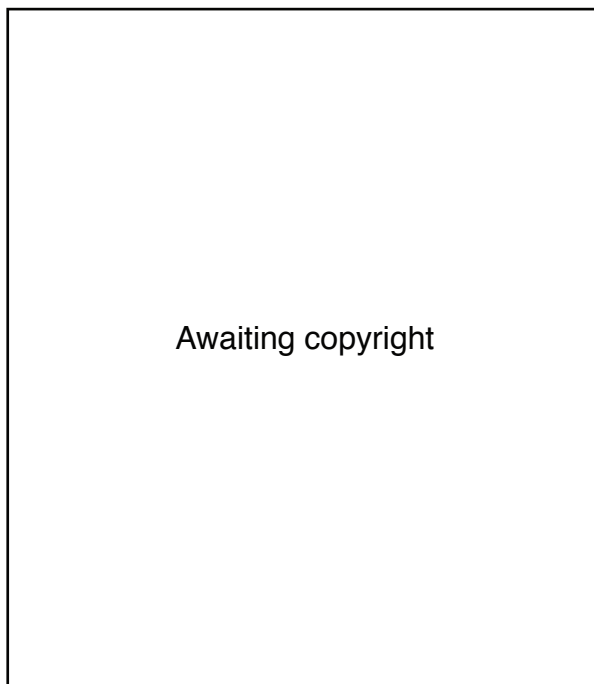
How many items were produced from 1 March to 30 June?

- (A) 220
(B) 320
(C) 420
(D) 520
- 4 Punctual attendance at your place of employment is a skill which affects others in the workplace.

This skill is best described as

- (A) personal.
(B) interpersonal.
(C) organisational.
(D) communication.

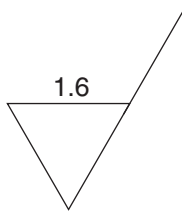
- 5 What hand-held power tool is best for preparing a sheet metal joint for blind/pop riveting?
- (A) Drill
 - (B) Shears
 - (C) Jigsaw
 - (D) Nibbler
- 6 Which tool is best for marking a line parallel to an edge?
- (A) Steel rule
 - (B) Trammels
 - (C) Jenny calipers
 - (D) Spring dividers
- 7 Part 2 in the assembly drawing has diagonal lines marked across it.



What do these lines indicate?

- (A) The part has been sectioned.
- (B) The part needs to be cut in half.
- (C) The part requires a knurled surface.
- (D) The part is positioned behind part 1.

- 8 What is the primary role of WorkCover?
- (A) To pay the salary of injured workers
 - (B) To fine companies for safety breaches
 - (C) To create safety legislation for the workplace
 - (D) To ensure the safety of all persons in the workplace
- 9 A surface finish symbol is pictured with a numerical value shown.



- Compared to the material surface with the value shown, a surface with a value of 3.2 would be
- (A) softer.
 - (B) harder.
 - (C) rougher.
 - (D) smoother.
- 10 Fumes in a poorly ventilated work area create an environmental hazard.
- Which of the following is the best method of control?
- (A) Install exhaust systems
 - (B) Provide industry standard PPE
 - (C) Use alternative work practices
 - (D) Limit time working in the environment
- 11 What does it signify when $M8 \times 1.25$ is written on a Tap?
- (A) Metric 8 Tap \times 1.25 pitch
 - (B) Metric 8 Tap \times 1.25 depth
 - (C) Middle 8 Tap \times 1.25 pitch
 - (D) Middle 8 Tap \times 1.25 depth

- 12** A customer complains to a workshop supervisor about the quality of a completed product.

What is the most appropriate strategy to deal with the customer's concern?

- (A) Refer the customer to another colleague
 - (B) Ask the customer to complete an evaluation form
 - (C) Explain that the product is within industry standard
 - (D) Listen to the customer and check the original order
- 13** What must be on display, read and understood by an employee before using a machine for the first time?
- (A) The material safety datasheet
 - (B) The safe work method statement
 - (C) The standard operating procedure
 - (D) The manufacturer's specifications
- 14** A 240kg brass bar contains 0.25% nickel by weight.

What is the weight of nickel in this bar?

- (A) 0.06 kg
 - (B) 0.6 kg
 - (C) 6.0 kg
 - (D) 60.0 kg
- 15** What is the main purpose for carrying out quality assurance during the manufacturing process?
- (A) To test and inspect products
 - (B) To ensure SOPs are followed
 - (C) To meet customers' requirements
 - (D) To check procedures and processes

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Metal and Engineering

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Centre Number

Section II

35 marks

Attempt Questions 16–19

Allow about 50 minutes for this section

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Student Number

Detach the page at the end of the paper and use Drawing 2012–1, TOW BAR, 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)

- (a) Identify the type of symbol located at A6. **1**

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- (b) Determine the overall length of the BALL. Show all working. **2**

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- (c) The sleeve located at A4 has a nominal length of 16 mm. **2**

What tolerance could be included for this dimension? Justify your answer.

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Question 16 continues on page 10

Question 16 (continued)

- (d) Explain the importance of having Drawing 2012–1 TOW BAR conform to drawing practice AS 1100 standards. **4**

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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)

6

- (a) The bracket, found at D3, is to be manufactured from a cut piece of mild steel $127 \times 25 \times 6$. Complete the table by proposing a sequence of steps that could be followed to mark out and manufacture the bracket prior to the two bends being made. List the tools required to complete each task.

<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 a series of quality checks that should be carried out to ensure the bracket has been manufactured and attached correctly. **3**

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End of Question 17

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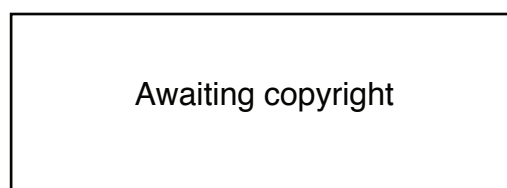
Section II (continued)

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Student Number

Question 18 (9 marks)

- (a) Name the hand-held power tool shown. 1



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- (b) Describe TWO operations that would be appropriate for this hand-held power tool to perform. 2

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- (c) Explain common faults or defects which may occur in this power tool making it unsafe to use. 2

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Question 18 continues on page 16

Question 18 (continued)

- (d) A fire in the workplace has started as a result of a worker using this hand-held power tool. Outline the emergency procedures that should be followed. **4**

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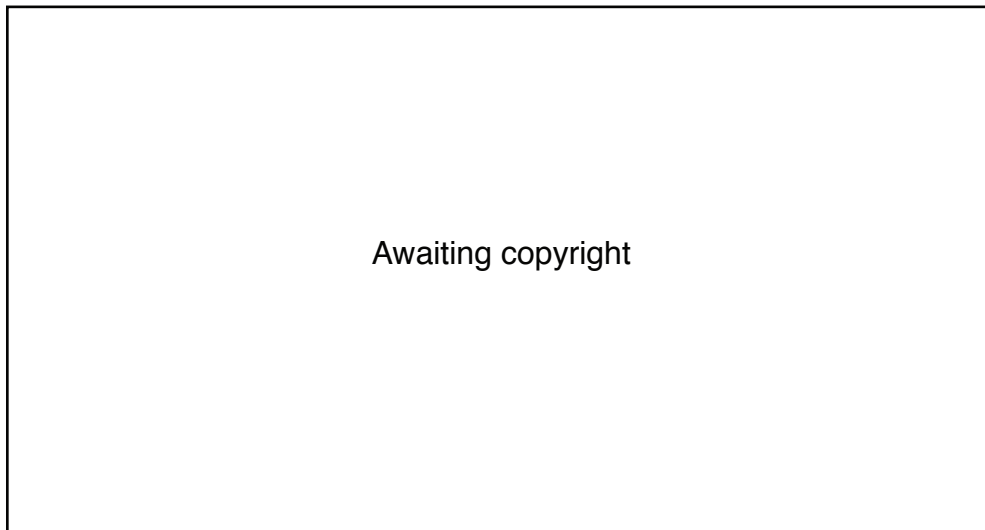
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End of Question 18

Question 19 (8 marks)

- (a) Two dimensioning approaches for recording measurement are shown. How can each method affect the accuracy of the finished product?

2



Chain dimensioning

Datum line dimensioning

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Question 19 continues on page 18

Question 19 (continued)

- (b) Describe a range of factors which should be considered when selecting a measuring device. **3**

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- (c) Explain the benefits to a company of accurate and correct measurements being used in the manufacturing process. **3**

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End of Question 19

Metal and Engineering

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
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Question 20 (15 marks)

All new employees in a metal and engineering workplace undergo an induction program specific to that workplace.

Explain how an effective induction program could be beneficial to the organisation, the employer, and to existing and new employees.

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)

Some examples of safety signs and their colour descriptions are shown below.



White on green



Black on yellow



Red oval on
black rectangle

Black text



Blue background
white symbol



Red circle
and bar

Black symbol
and text

Acknowledgement: Reproduced with permission from The Sign Place Maitland
www.signplacemaitland.com.au

- (a) Explain why safety signage is an effective means of communication in the metal and engineering industry. **2**
- (b) With reference to the examples given above, describe the different classes of safety signage and their application. **4**
- (c) Explain the role of employers, employees and workplace health and safety (formerly OHS) representatives in the installation of safety signage and the implementation of safety procedures. **9**

End of paper

Metal and Engineering

Detach this sheet and use Drawing 2012–1 to answer Questions 16–17.

Please turn over

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