

Metal and Engineering

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black pen
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9, 11, 13 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 9–16

35 marks

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

Section III Page 17

15 marks

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

Section IV Page 18

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.

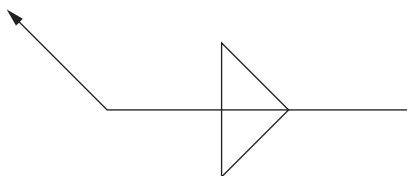
- 1** Which of the following involves non-verbal communication?
- (A) Displaying signage
 - (B) Using a two-way radio
 - (C) Conducting WHS meetings
 - (D) Carrying out a site induction
- 2** The letters *RPM* are found on the label of an angle grinder.
- What do these letters stand for?
- (A) Rotations per minute
 - (B) Revolutions per minute
 - (C) Rotating power machine
 - (D) Reciprocating power machine
- 3** Which of the following fire extinguishers should NOT be used to extinguish a flammable liquid fire?
- (A) Carbon dioxide
 - (B) Dry chemical
 - (C) Foam
 - (D) Water

4 A drum in a workshop has the following label.



The drum is likely to contain which one of the following substances?

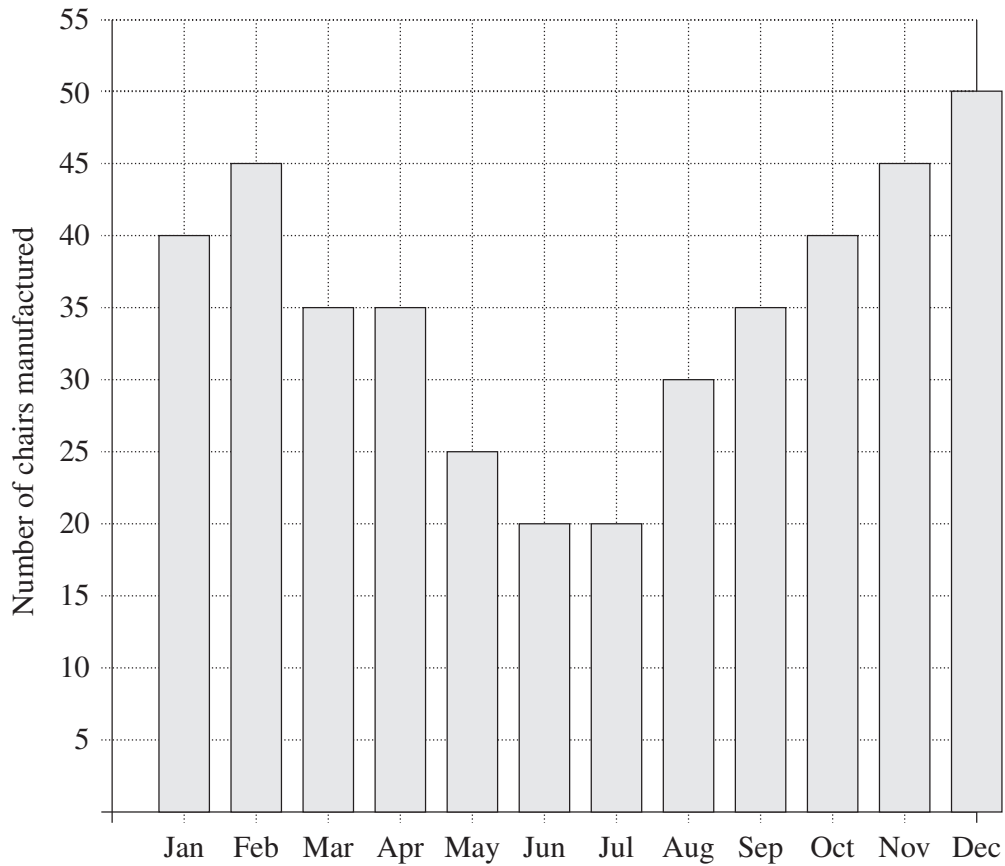
- (A) Acetone
 - (B) Cutting compound
 - (C) Hand cleaner
 - (D) Water-based paint
- 5 An important principle of equal employment opportunity is that it promotes selection based on
- (A) age.
 - (B) merit.
 - (C) gender.
 - (D) religion.
- 6 What does the welding symbol pictured below indicate?



- (A) Weld all around
- (B) Fillet weld all around
- (C) Fillet weld on both sides of the joint
- (D) Square vee butt weld on both sides of the joint

Use this graph to answer Questions 7–8.

L & B Manufacturing produces aluminium game fishing chairs. The graph shows its monthly sales figures over a calendar year.



7 What was the average number of chairs manufactured per month?

- (A) 35
- (B) 38
- (C) 41
- (D) 44

8 All the chairs manufactured were sold.

If the profit from each chair sold is \$50, how much profit was made during the third quarter of the year?

- (A) \$3 500
- (B) \$3 750
- (C) \$4 000
- (D) \$4 250

- 9 What is a *datum*?
- (A) A device used to measure material
 - (B) A fixed starting point used when marking out
 - (C) A point from which measurements are located
 - (D) A reference line showing hidden detail
- 10 What does a *Safe Work Method Statement* list?
- (A) The requirements to manufacture a product
 - (B) Details of the cost to manufacture a product
 - (C) The number of people involved in production
 - (D) All tools, resources and appropriate procedures for a job

- 11 Spindle speed can be calculated using the following formula:

$$\text{spindle speed} = \frac{320 \times \text{CS}}{D}$$

What is the spindle speed required to drill a 10 mm hole into a piece of 20 mm brass plate if the CS for brass is 61 mm/min?

- (A) 640
 - (B) 976
 - (C) 1952
 - (D) 3200
- 12 In the industrial manufacture of a product when should quality control be performed?
- (A) At the end of each day
 - (B) At the start of work each day
 - (C) At the completion of manufacture
 - (D) At the completion of each stage of manufacture

- 13** What does risk management involve?
- (A) The identification of a risk assessment
 - (B) The identification of hazards and the assessment and control of risks
 - (C) The identification and risk analysis of the equipment used to complete a particular task
 - (D) The identification of hazards and the costing and risk analysis of the number of workers on site at any time
- 14** What is the preferred method of risk control in the workplace in relation to work health and safety?
- (A) Administrative
 - (B) Elimination
 - (C) Substitution
 - (D) Personal Protective Equipment (PPE)
- 15** What is the main difference between an enterprise agreement and an award?
- (A) An award must comply with state or federal legislation, while an enterprise agreement does not have to.
 - (B) An enterprise agreement can be a verbal agreement, while an award must be filed as a legal document.
 - (C) An award applies across an industry or type of work, while an enterprise agreement is a negotiated contract between an employer and employees.
 - (D) An enterprise agreement is not available to union members and is voluntary, while all workers are entitled to conditions detailed under an award.

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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 2015–1, STRUCTURE COLUMN, to answer Questions 16–17.

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

Question 16 (7 marks)

- (a) What is the thickness of the base plate located at E1? 1

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- (b) Calculate the length of the column (ITEM 3) prior to assembly. Show all working. 2

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- (c) The symbol Z–Z located at C4 gives instructions to the manufacturer. 4

Explain the purpose of these instructions.

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Centre Number

Section II (continued)

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Student Number

Question 17 (10 marks)

The gusset plate (ITEM 7) is to be manufactured from a pre-cut piece of mild steel 810 × 230 × 20 mm.

- (a) Propose a sequence of steps for marking out the four M6 × 1.0 holes. **3**

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- (b) Propose a sequence of steps for manufacturing the four M6 × 1.0 holes. **4**

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Question 17 continues on page 12

Question 17 (continued)

- (c) The gusset plate (ITEM 7) is to be manufactured in large production numbers. Describe quality system procedures that could be used to minimise variation between each gusset plate. **3**

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End of Question 17

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Centre Number

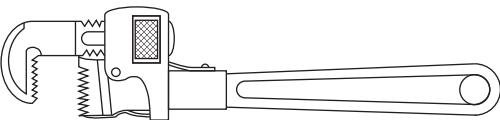
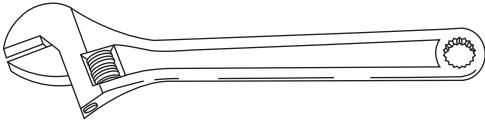

Section II (continued)

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Student Number

Question 18 (9 marks)

- (a) Complete the table by naming the hand tools shown and stating ONE common application for each tool. **6**

<i>Hand tool</i>	<i>Name</i>	<i>Application</i>
		
		
		

"Wrenches and Spanners". Engineering an Industry Study, 4th Ed. S.D. Baker, PCS Publications, 2014. ISBN 9780947225513. Reproduced by permission

- (b) What are the most important considerations when selecting and using a spanner or wrench? **3**

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Centre Number

Section II (continued)

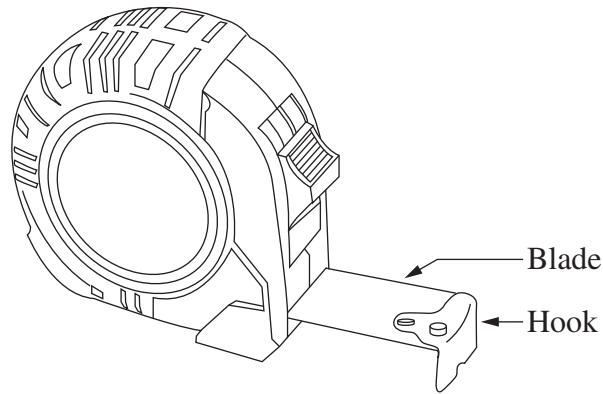
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Student Number

Question 19 (9 marks)

- (a) The tape measure shown has a riveted 'hook' at the end of the blade.

2



Explain why the hook moves and is not securely fixed.

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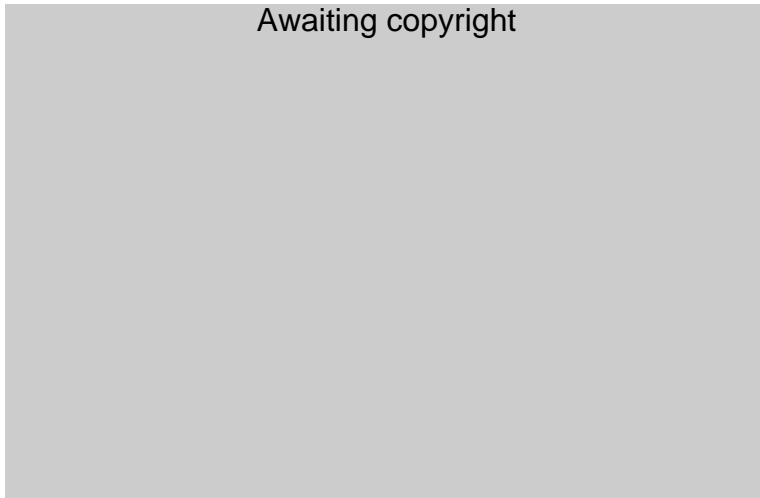
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Question 19 continues on page 16

Question 19 (continued)

- (b) A combination set is shown.



Outline the uses for each stock (*A*, *B* and *C*) that is attached to the interchangeable rule.

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- (c) Describe the consequences of NOT checking and calibrating graduated measuring devices on a regular basis.

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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.

Your answer 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)

Explain the importance of selecting, using and maintaining power tools in the metal and engineering workplace.

Please turn over

Section IV

15 marks

Attempt Question 21

Allow about 25 minutes for this section

Answer this question in TWO SEPARATE writing booklets. Use one writing booklet to answer part (a) of the question. Use the other writing booklet to answer part (b) of the question. Extra writing booklets are available.

Question 21 (15 marks)

The management team of a metal and engineering workshop has conducted a safety audit after a series of minor injuries to workers. The team is also concerned that there have been complaints from clients about customer service and poor quality work.

Answer part (a) of the question in a SEPARATE writing booklet.

- (a) Propose a range of work practices that should be introduced in order to provide a safe working environment for this workshop. **5**

Answer part (b) of the question in a SEPARATE writing booklet.

- (b) Explain how better work practices could affect this business's profitability and services to clients. **10**

End of paper

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Detach this sheet and use Drawing 2015–1 to answer Questions 16–17.

Please turn over

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