

# 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, 13 and 15

## Total marks – 80

### Section I Pages 2–7

#### 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

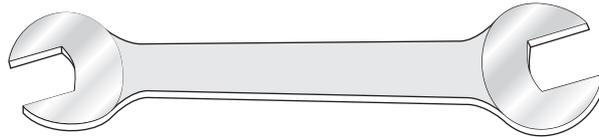
Attempt Questions 1–15

Allow about 20 minutes for this section

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

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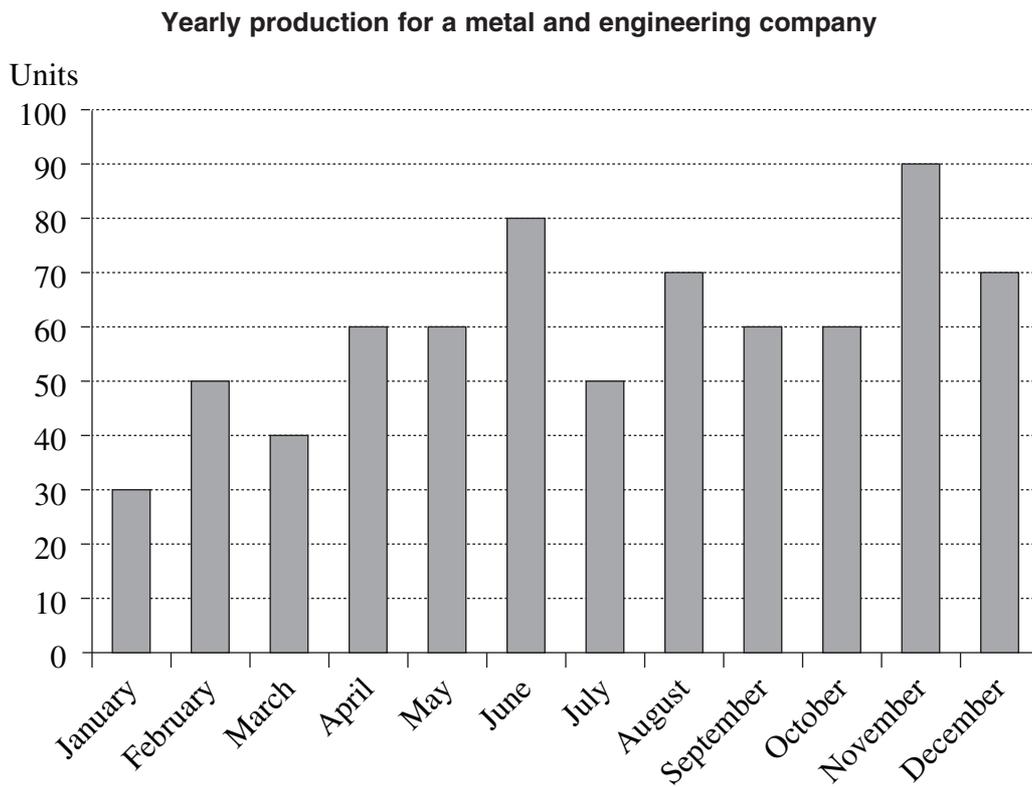
- 1 What is the name of the tool illustrated?



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- (A) Adjustable spanner  
(B) Combination spanner  
(C) Double-ended ring spanner  
(D) Double-ended open end spanner
- 2 What tool is used to cut an internal thread in a 14 mm hole?
- (A) Button die  
(B) Die stock  
(C) Taper tap  
(D) Twist drill
- 3 A precision component is to be mass-produced in a metal and engineering workshop.
- What is the most accurate method of conveying the required specifications to the workshop?
- (A) Sending a photo  
(B) Providing a sketch  
(C) Providing an engineering drawing  
(D) Sending a verbal telephone message

Use the following graph to answer Questions 4 and 5.



**4** How many units were produced between January and June inclusive?

- (A) 230
- (B) 320
- (C) 380
- (D) 430

**5** What was the average number of units produced monthly for the entire year?

- (A) 50
- (B) 55
- (C) 60
- (D) 65

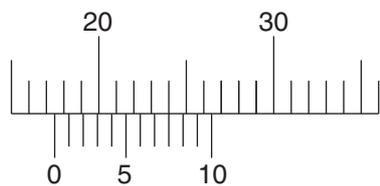
- 6 What is the smallest increment that can be measured on the sleeve of a standard micrometer?
- (A) 0.01 mm
  - (B) 0.02 mm
  - (C) 0.05 mm
  - (D) 0.50 mm

- 7 The owner of a workplace has installed exhaust fans to extract fumes from the painting booth.

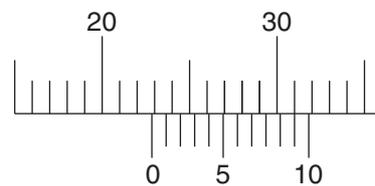
What type of hazard will this action reduce?

- (A) Biological
  - (B) Chemical
  - (C) Mechanical
  - (D) Psychological
- 8 On which of the following vernier scales is a reading of 21.40 shown?

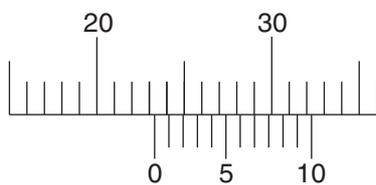
(A)



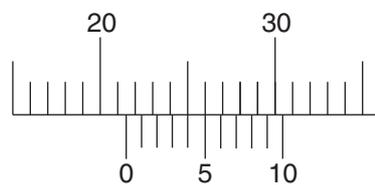
(B)



(C)



(D)



- 9** Who has the responsibility for conducting regular checks around the workplace to make sure that all exits are clear of obstructions?
- (A) The cleaning staff
  - (B) A WorkCover officer
  - (C) The owner of the business
  - (D) The work health and safety representative

- 10** An employee is contracted to work for an employer while learning through on-the-job training and attendance at a TAFE course.

What is this type of employee known as?

- (A) An apprentice
  - (B) A contractor
  - (C) A training employee
  - (D) A work experience student
- 11** A component is to be drawn using a scale of 1:50.

If the actual length of the component is 1250 mm, what would be the length of the drawing?

- (A) 0.04 mm
- (B) 25 mm
- (C) 12 500 mm
- (D) 62 500 mm

**12** This object is to be viewed from the direction given by the arrow.

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Which of the following shows the correct view?

(A)

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(B)

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(C)

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(D)

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**13** Which of the following bodies regulates the operating hours of a metal and engineering

- (A) WorkCover
- (B) Trade unions
- (C) The local council
- (D) The Environmental Protection Authority

- 14** Annual performance reviews of a worker are conducted by the employer in order to
- (A) provide guidance to the worker in relation to other workers.
  - (B) assess the performance of the worker in comparison to the managing director.
  - (C) assess the performance of a company against national performance benchmarks.
  - (D) provide guidance to both the worker and the employer for improvements in the future.
- 15** What piece of legislation has been enacted to ensure the fair treatment of customers and employees?
- (A) *The Anti-Discrimination Act 1977 (NSW)*
  - (B) *The Work Health and Safety Act 2011 (NSW)*
  - (C) *The Competition and Consumer Act 2010 (Cth)*
  - (D) *The Equal Employment Opportunity (Commonwealth Authorities) Act 1987 (Cth)*

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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 2016–1, COLUMN SPLICE, to answer Question 18.

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

Show all relevant working in questions involving calculations.

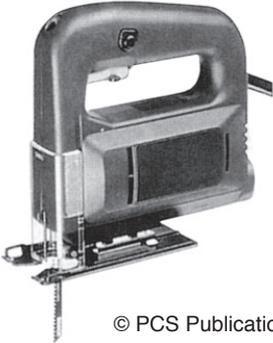
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**Question 16** (6 marks)

**Please turn over**

**Question 16** (6 marks)

A portable power tool is shown.



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(a) State the name of the portable power tool. **1**

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(b) Explain why it would be more appropriate to use a fine pitch blade rather than a coarse pitch blade when cutting thin gauge material. **2**

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.....  
.....

(c) Why is it important to report accidents involving power tools to your supervisor as soon as they occur? **3**

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.....

**Question 17** (9 marks)

- (a) In the table below, name the most appropriate tool or gauge for measuring the features or dimensions listed. **3**

<i>Feature/Dimension</i>	<i>Tool/Gauge</i>
The pitch of a screw thread	.....
A 5 m length of steel	.....
A 0.2 mm gap	.....
An internal radius	.....
A 2.3 mm drill bit	.....
The inside diameter of a machined hole	.....

- (b) Explain why it is important to adhere to a tolerance in the production of products in the metal and engineering industry. **2**

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- (c) Name the hand tools required to produce an internal M12 thread in an existing blind hole and justify their use. **4**

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Centre Number

Section II (continued)

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Student Number

**Question 18** (11 marks)

Use the drawing of the Column Splice on page 20 to answer Question 18.

- (a) What does the term 'NTS' mean in the Title Block located at F3? **1**

.....  
.....

- (b) A customer has ordered 14 column splices. The material used to manufacture the GIRT CLEAT (Item 3) is 50 × 6 mm flat bar which will be cut using a cold cut saw with a 5 mm blade. **2**

Calculate the amount of material required to complete this part of the order.

.....  
.....  
.....  
.....

- (c) This drawing is classed as a detailed assembly drawing. Explain why this is the most appropriate type of drawing for the manufacture of the finished item. **2**

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.....  
.....  
.....

**Question 18 continues on page 14**

Question 18 (continued)

- (d) The CAP PLATE (Item 2) is to be manufactured from a precut piece of mild steel  $75 \times 6 \times 140$  mm.

6

Complete the table by providing a sequence of steps for both marking out and manufacturing the CAP PLATE and listing the tools required to complete each task.

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

**End of Question 18**

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Centre Number

**Section II (continued)**

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Student Number

**Question 19 (9 marks)**

- (a) Safety signs are generally pictorial and contain very little written text. **2**

Explain why safety signs are presented this way.

.....

.....

- (b) Name the four categories of safety sign and their two main colours in the table below. **4**

<i>Sign category</i>	<i>Example of sign</i>	<i>Two main colours of the signs in this category</i>
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**Question 19 continues on page 16**

Question 19 (continued)

- (c) Describe how the metal and engineering industry uses material safety data sheets (MSDS). **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.

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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
- 

### Question 20 (15 marks)

A steel delivery is expected to arrive at the beginning of the day shift. The material is to be unloaded manually and consists of lengths of flat bar, angle and pipe.

Explain the issues the supervisor must consider when completing a safe work method statement for the safe unloading of the delivery truck and the method of racking the material.

**Please turn over**

## Section IV

**15 marks**

**Attempt Question 21**

**Allow about 25 minutes for this section**

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

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### **Question 21** (15 marks)

The metal and engineering industry can be a potentially hazardous and dangerous environment. There are a number of ways of addressing workplace health and safety requirements within any organisation.

- (a) Who is required to undergo an induction and when? **2**
- (b) Explain why communication is important to ensure that injuries in the workplace are minimised. **3**
- (c) Explain the importance of an induction process and the information that needs to be included. **10**

**End of paper**

# Metal and Engineering

Detach this sheet and use Drawing 2016–1 to answer Question 18.

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