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Centre Number

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Student Number

2003
HIGHER SCHOOL CERTIFICATE
EXAMINATION

Industrial Technology

Metals and Engineering Industries

General Instructions

- Reading time – 5 minutes
- Working time – $1\frac{1}{2}$ hours
- Write using black or blue pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of this page and pages 5, 9, 17 and 21

Total marks – 100

Section I Pages 2–13

60 marks

- Attempt Questions 1–3
- Allow about 55 minutes for this section

Section II Pages 17–23

40 marks

- Attempt Questions 4–5
- Allow about 35 minutes for this section

Section I

60 marks

Attempt Questions 1–3

Allow about 55 minutes for this section

Answer the questions in the spaces provided.

Marks

Question 1 (20 marks)

IND-TECH is a large company situated in the inner city, operating in the metals and engineering industry specialising in high quality products and/or services. For a variety of reasons the company has decided to purchase and relocate to a new site, 200 km from its present inner city site.

- (a) Identify TWO issues that may have influenced the decision to relocate. **2**

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- (b) Outline TWO environmental responsibilities that must be dealt with when IND-TECH vacates the present site. **2**

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Question 1 continues on page 3

Question 1 (continued)

- (c) Discuss TWO factors that IND-TECH should consider when choosing the alternative site. **4**

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- (d) Identify and describe TWO occupational health and safety (OHS) issues that IND-TECH would need to review/develop for the new workplace. **4**

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Question 1 continues on page 4

Industrial Technology
Metals and Engineering Industries

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Centre Number

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Student Number

Section I (continued)

Marks

Question 2 (20 marks)

Management at IND-TECH has decided to upgrade the level of mechanisation as part of its relocation.

- (a) Define the term *mechanisation*. 2

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- (b) Outline an aspect of IND-TECH's operations that could be investigated for upgraded mechanisation. 2

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Question 2 continues on page 6

Question 2 (continued)

- (c) Describe TWO methods of evaluating the effects of upgraded mechanisation on IND-TECH's operation. **4**

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- (d) Upgraded mechanisation will require staff training. Outline the advantages for IND-TECH and its workers of accessing training programs. **4**

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Question 2 continues on page 7

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Industrial Technology
Metals and Engineering Industries

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Centre Number

Section I (continued)

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Student Number

Question 3 (20 marks)

Please turn over

Question 3 (20 marks)

- (a) The following extract is from a draft report that was produced using computer software.



Half-Yearly Production Report
January 2003 – June 2003

<i>Production rate summary</i>		
<i>Month</i>	<i>Year</i>	<i>Production rate (units)</i>
January	2003	270
February	2003	300
March	2003	325
April	2003	335
May	2003	340
June	2003	370

Growth in production is due to:

- Improved technology
- Better training
- Fewer accidents in the workplace
- Increased access to raw materials

Page 1

- (i) Name a computer software application that could have been used to produce this report. **1**

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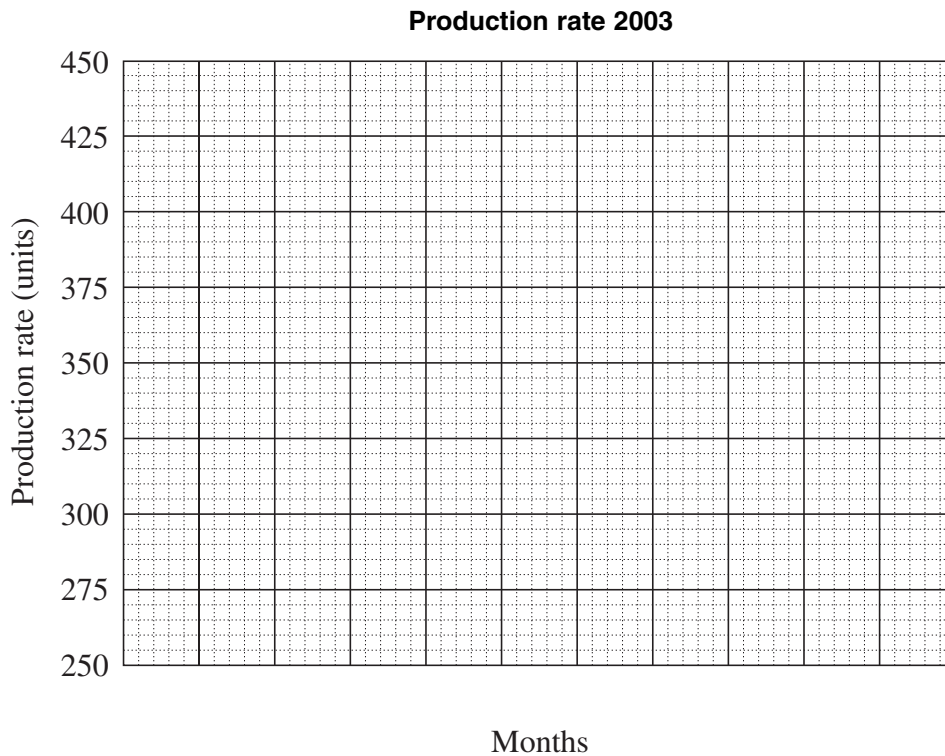
- (ii) Identify FOUR formatting features that have been used in the production of this report. **2**

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Question 3 continues on page 11

Question 3 (continued)

- (iii) (1) Use the information from the production report to: 3
 - produce a graph that shows the monthly production rate (indicate the months on the horizontal axis);
 - graph the average monthly production rate (January–June).
- (2) Assuming the production trend continues, indicate on the graph the predicted production rate for September 2003. 2



- (b) Materials handling injuries make up 40% of workplace injuries. Describe a procedure IND-TECH could implement to communicate improved materials handling strategies to its employees. 4

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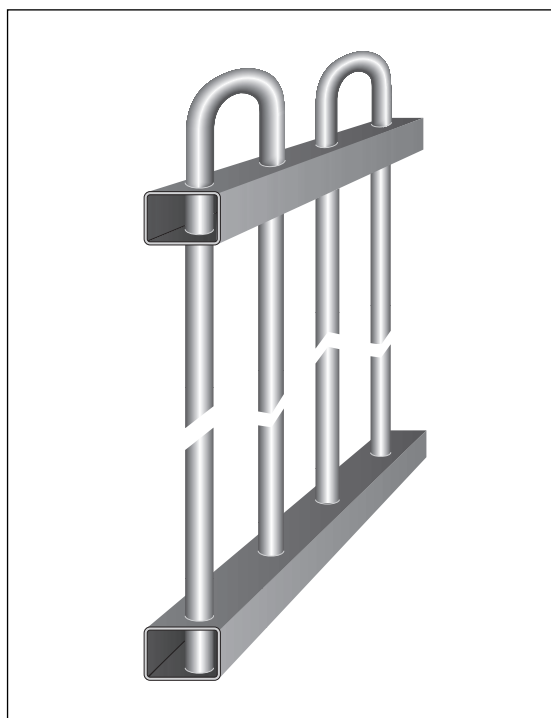
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Question 3 continues on page 12

Question 3 (continued)

- (c) In its new location, IND-TECH has an opportunity to reorganise its production system to make use of increased mechanisation and to improve efficiency. Shown below is a sample of a metal pool fence manufactured by IND-TECH.

8



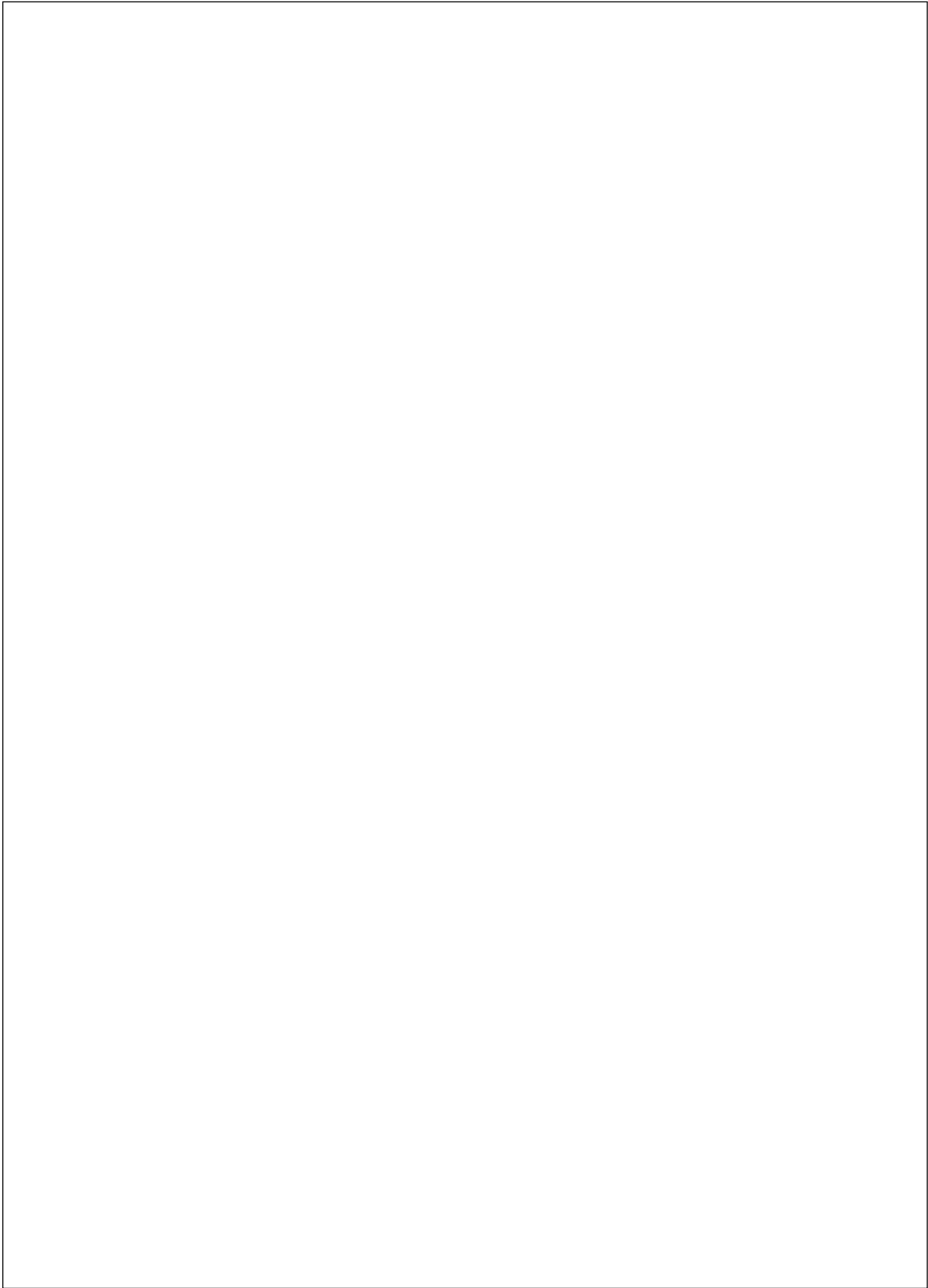
Metal pool fence

Based on your study of the metals and engineering industry, use the space provided on page 13 to graphically represent the processes used to produce the metal fence shown. In your answer you should:

- show the sequencing of the components and/or processes;
- name each piece of equipment used;
- state the process carried out with each piece of equipment;
- indicate where quality control would occur, and what would be checked.

Question 3 continues on page 13

Question 3 (continued)



End of Question 3

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2003 HIGHER SCHOOL CERTIFICATE EXAMINATION
Industrial Technology
Metals and Engineering Industries

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Centre Number

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Student Number

Section II

40 marks

Attempt Questions 4–5

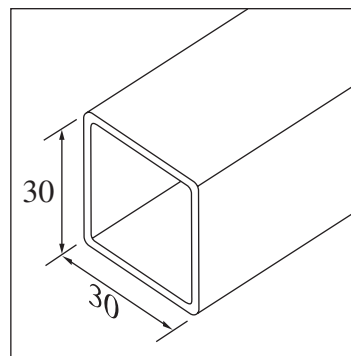
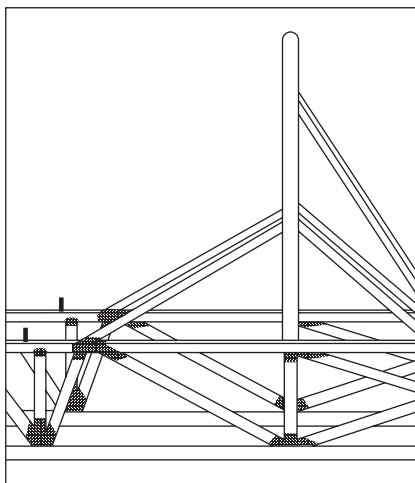
Allow about 35 minutes for this section

Answer the questions in the spaces provided.

Marks

Question 4 (20 marks)

A sports car chassis, similar to the one shown below, is to be constructed from steel RHS tubing.



(a) The tubing is described as $30 \times 30 \times 1.6$ RHS.

(i) What do the letters RHS stand for?

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(ii) Identify the feature of the tubing described by 1.6.

1

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Question 4 continues on page 18

Question 4 (continued)

- (b) Explain why the tubing has rounded corners and not sharp right-angled corners. **2**

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- (c) To construct the chassis, many identical components need to be cut from the tubing. **4**

Identify a machine, and describe how the machine would be set up to cut the components.

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Question 4 continues on page 19

Question 4 (continued)

- (d) The components of the tubular chassis are to be welded together. Identify and justify a suitable welding process, and outline the safety precautions that must be observed during the welding operation. **4**

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Question 4 continues on page 20

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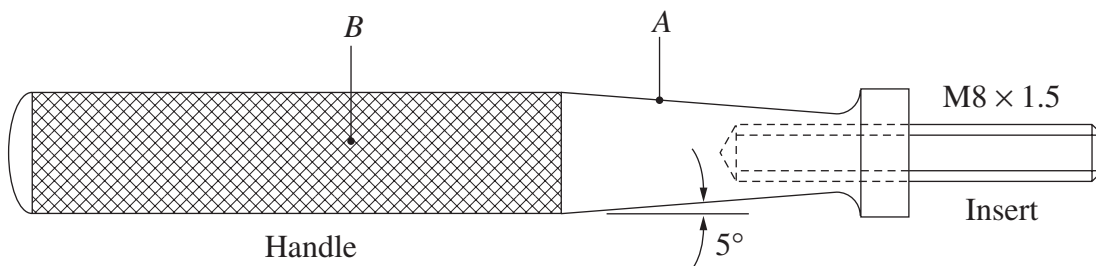
Student Number

Section II (continued)

Marks

Question 5 (20 marks)

The handle for a machine component is shown below. It is to be machined using a lathe.



- (a) Identify the features labelled by the letters *A* and *B*. 2

A

B

- (b) Describe how the right hand end of the handle is made square after cutting to size. 2

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Question 5 continues on page 22

Question 5 (continued)

- (c) Identify the adjustments that must be made to the lathe in order to produce feature *A*, and describe the process of cutting this feature. 3

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- (d) Describe the process of producing feature *B*. What safety checks are necessary to ensure the safe operation of the lathe? 5

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Question 5 continues on page 23

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