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Centre Number

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Student Number

2003
HIGHER SCHOOL CERTIFICATE
EXAMINATION

Industrial Technology

Automotive 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 automotive 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

Question 1 (continued)

- (e) Explain the possible environmental and sociological effects on the community of IND-TECH's relocation. **8**

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End of Question 1

Industrial Technology
Automotive 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

Question 2 (continued)

- (e) Identify and analyse issues that could arise between management and workers as a result of upgraded levels of mechanisation.

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End of Question 2

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Industrial Technology
Automotive 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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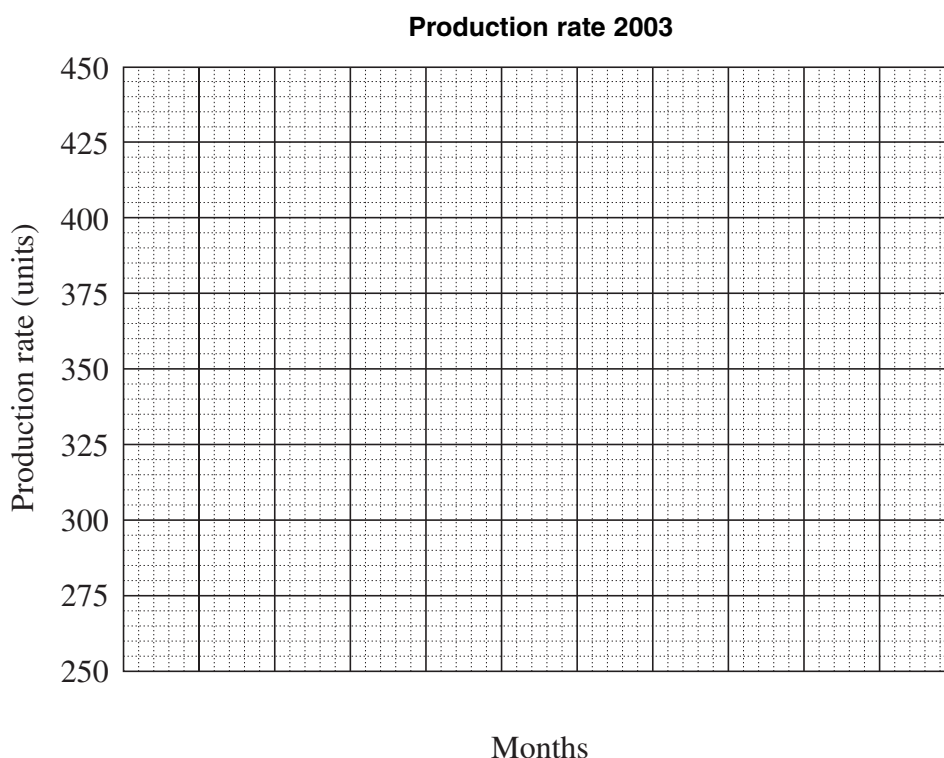
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Question 3 continues on page 11

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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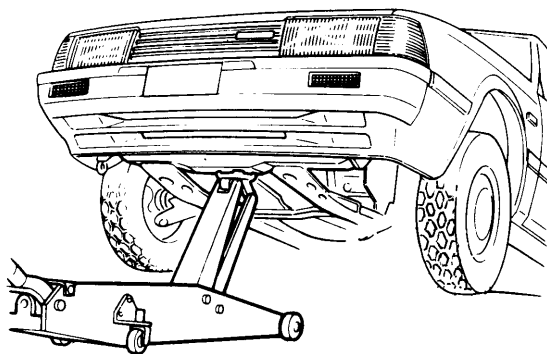
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Question 3 continues on page 12

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 service offered by IND-TECH of changing the front left brake pads. **8**



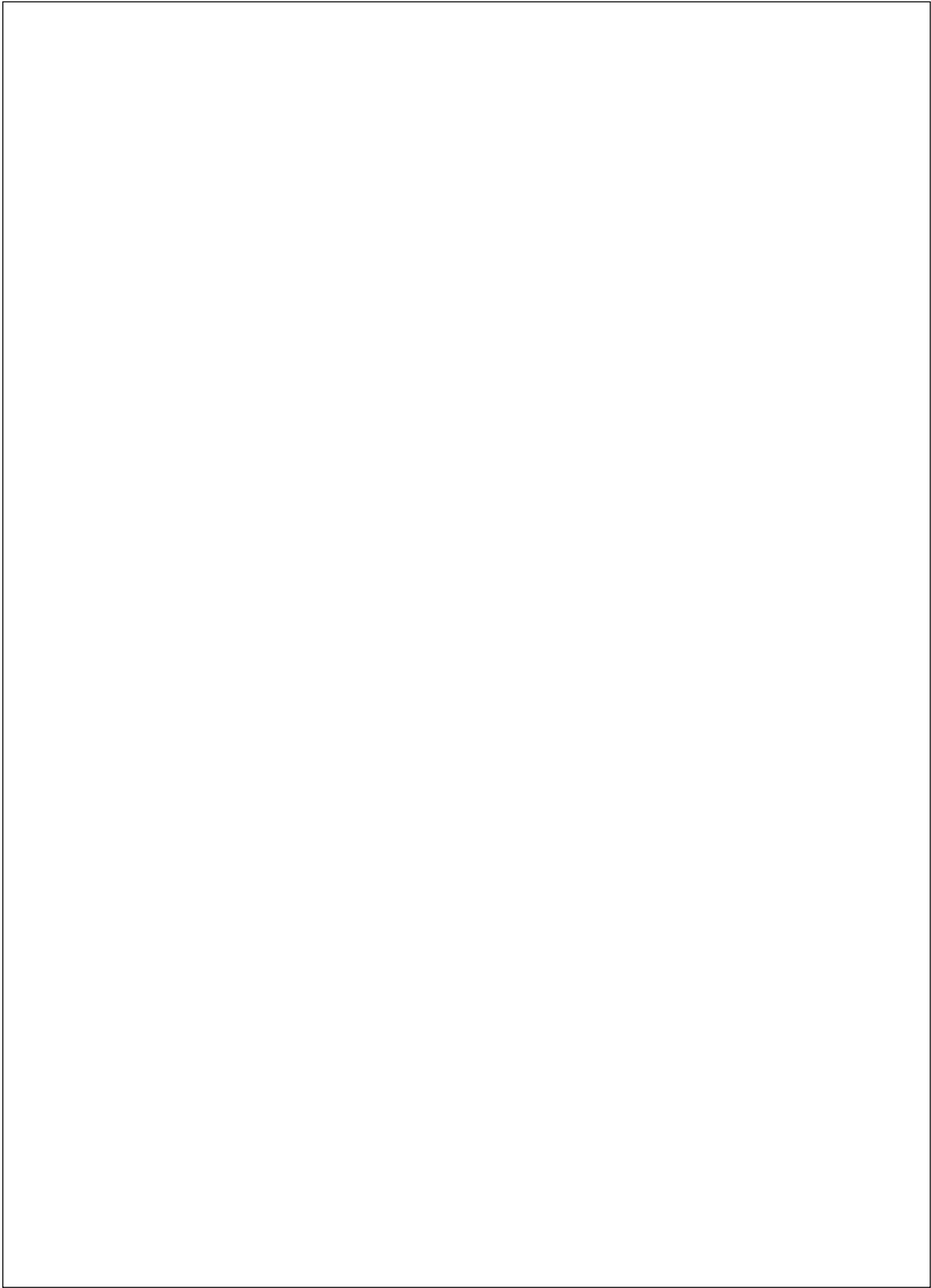
Jack under front cross-member

Based on your study of the automotive industry, use the space provided on page 13 to graphically represent the processes used to carry out the service represented in the drawing 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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Industrial Technology Automotive 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) Identify an advantage that a rotary engine has over a reciprocating engine. **1**

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- (b) Identify reasons why governments need to regulate vehicle modifications. **2**

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Question 4 continues on page 18

Question 4 (continued)

- (c) The diagrams below show two stages in the operation of a 4-stroke Otto cycle engine. Identify and describe the process that is occurring at each stage. 4

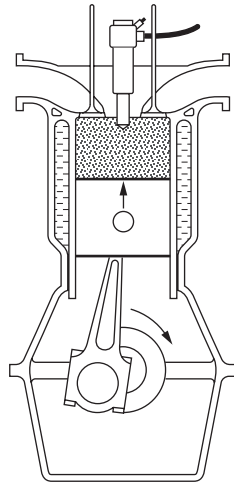


Diagram A

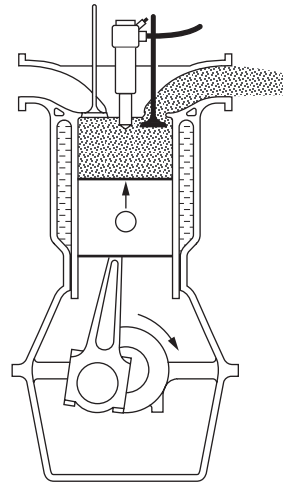


Diagram B

Ed May & William H Crouse, 2000, *Automotive Mechanics* , vol 1, 4th edn, McGraw-Hill Book Company Australia, Sydney.

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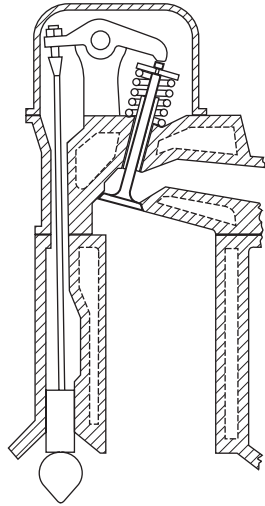
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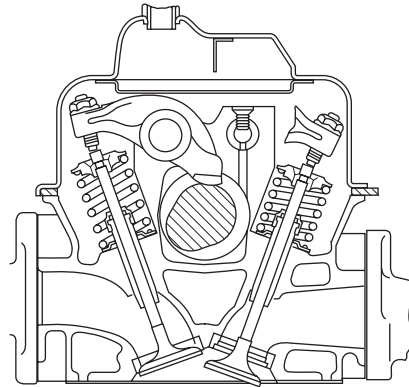
Question 4 continues on page 19

Question 4 (continued)

- (d) Diagrams of an overhead valve cylinder head and an overhead cam cylinder head are shown below. Identify and explain the advantages the overhead cam cylinder head has over the overhead valve cylinder head. 5



Overhead valve cylinder head



Overhead cam cylinder head

Ed May, 2000, *Automotive Mechanics*, vol 2, 6th edn, McGraw-Hill Book Company Australia, Sydney.

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Question 4 continues on page 20

Question 4 (continued)

- (e) Commuter vehicles can be powered by either petrol or electricity. Compare the power sources, and discuss the advantages and disadvantages of each. **8**

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End of Question 4

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Student Number

Section II (continued)

Marks

Question 5 (20 marks)

- (a) Explain the purpose of the differential gears in a rear-wheel drive vehicle. 2

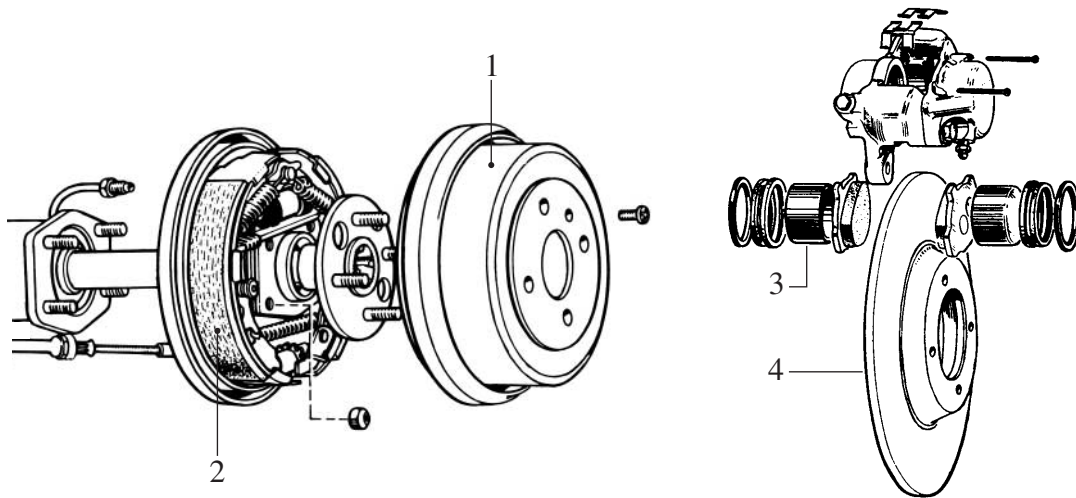
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- (b) Diagrams of a drum brake and a disc brake are shown. Identify the indicated parts. 2



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Question 5 continues on page 22

Question 5 (continued)

- (c) Identify TWO advances in disc brake technology, and explain how these have improved braking efficiency. **4**

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- (d) Outline safety considerations that are important when changing a wheel on a car. **4**

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Question 5 continues on page 23

Question 5 (continued)

- (e) A small sedan has minor panel damage. Outline the process for the repair and refinishing of the damaged panel.

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