

B O A R D O F S T U D I E S
NEW SOUTH WALES

2010

**HIGHER SCHOOL CERTIFICATE
EXAMINATION**

Automotive

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue 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 2–5

15 marks

- Attempt Questions 1–15
- Allow about 20 minutes for this section

Section II Pages 9–16

35 marks

- Attempt Questions 16–21
- Allow about 50 minutes for this section

Section III Page 17

15 marks

- Attempt Question 22
- Allow about 25 minutes for this section

Section IV Page 18

15 marks

- Attempt Question 23
- 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 explosive gas is released when charging a 12V lead-acid cell battery?
- (A) Nitrogen
 - (B) Hydrogen
 - (C) Carbon dioxide
 - (D) Carbon monoxide
- 2 What special service tool (SST) is used to perform specific gravity tests on battery cells?
- (A) AVR meter
 - (B) Hydrometer
 - (C) Battery load tester
 - (D) Digital multimeter
- 3 Where is a vehicle's tyre placard/sticker usually displayed?
- (A) In the glove box
 - (B) In the owner's manual
 - (C) On the door sill panel
 - (D) On the underside of the bonnet
- 4 What tool 'drive' sizes are typically used in an automotive workshop?
- (A) $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch
 - (B) $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{2}{3}$ inch
 - (C) $\frac{1}{4}$ inch, $\frac{1}{2}$ inch, $\frac{2}{3}$ inch, 1 inch
 - (D) $\frac{1}{4}$ inch, $\frac{1}{2}$ inch, $\frac{2}{3}$ inch, $\frac{4}{5}$ inch

- 5 On a four-wheel drive vehicle, the component that transmits drive from the engine to the automatic transmission is the
- (A) flywheel.
 - (B) pressure plate.
 - (C) transfer gearbox.
 - (D) torque converter.
- 6 Which of the following components reduces harmful exhaust emissions from entering the atmosphere?
- (A) Muffler
 - (B) PCV valve
 - (C) Oxygen sensor
 - (D) Catalytic converter
- 7 The image below shows a water treatment system typically found in an automotive workshop.



Where is the treated water discharged?

- (A) Into a sewer drain
- (B) Into a pit for collection
- (C) Into a stormwater drain
- (D) Into a recycling tank for workshop use

- 8** Which of the following best describes the purpose of a bunded area?
- (A) To contain chemicals and prevent accidental ignition
 - (B) To store chemicals and prevent accidental human exposure
 - (C) To contain contaminants and prevent pollution of stormwater
 - (D) To hold hazardous materials and prevent accidental respiration of fumes
- 9** What does a safe operating procedure (SOP) outline?
- (A) Potential physical hazards in a workshop
 - (B) The correct method for the safe use of workplace chemicals
 - (C) The most suitable OHS practice for using a specific tool or equipment
 - (D) The specific safety hazards associated with all stored hazardous materials
- 10** What is the role of WorkCover?
- (A) To develop safe operating procedures
 - (B) To regulate and police OHS matters in the workplace
 - (C) To provide financial assistance to persons injured in the workplace
 - (D) To provide training to certify workers' competency in OHS matters
- 11** What is the correct procedure to follow when disposing of a solvent from an automotive repair shop?
- (A) Treat, clean, recycle and reuse the solvent
 - (B) Pour the solvent into an oil and water separator for treatment
 - (C) Store the solvent in a sealed tin and dispose into an industrial waste bin
 - (D) Store the solvent in a bunded area for collection by an approved disposal agent
- 12** What is the primary purpose of a job card?
- (A) To document the required parts inventory
 - (B) To ensure job costing doesn't exceed the initial quotation
 - (C) To provide work instructions for the nominated repair procedure
 - (D) To provide a contractual agreement for the repairs approved by the customer

- 13** What government body has the responsibility for issuing trade licences within the automotive industry?
- (A) Office of Fair Trading (OFT)
 - (B) Motor Traders Association (MTA)
 - (C) Automotive Training Board (ATB)
 - (D) Institute of Automotive Mechanical Engineers (IAME)
- 14** Which fire extinguisher would be most suitable to use on an engine bay fire in a vehicle fitted with LPG?
- (A) Water
 - (B) Foam
 - (C) Dry chemical powder
 - (D) Carbon dioxide (CO₂)
- 15** Which test result identifies a poor earth connection in a lighting circuit?
- (A) Increased current flow and bulb off
 - (B) Increased current flow and bulb dull
 - (C) Decreased current flow and bulb dull
 - (D) Decreased current flow and bulb bright

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Centre Number

Section II

35 marks

Attempt Questions 16–21

Allow about 50 minutes for this section

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Student Number

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

Question 16 (5 marks)

Explain how computer-based technologies can improve the efficiency of an automotive workshop. Provide relevant examples to support your answer. **5**

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Question 17 (6 marks)

- (a) What are the steps to follow when an injury is sustained in the workplace? **2**

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- (b) Name the body that assists employers and employees to establish an Apprenticeship/Traineeship contract. **1**

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- (c) What are the key elements of an effective evacuation management plan in an automotive workplace? **3**

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Centre Number

Section II (continued)

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Student Number

Question 18 (7 marks)

- (a) Outline the procedure for using a trolley jack to safely raise a vehicle to a suitable height before commencing work. **4**

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- (b) Why is it important to tighten fasteners progressively and in a sequence when components are secured with multiple fasteners? **1**

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Question 18 continues on page 12

Question 18 (continued)

(c) Two different examples of the same tool are shown.

2



Name the tool and state its purpose.

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End of Question 18

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Centre Number

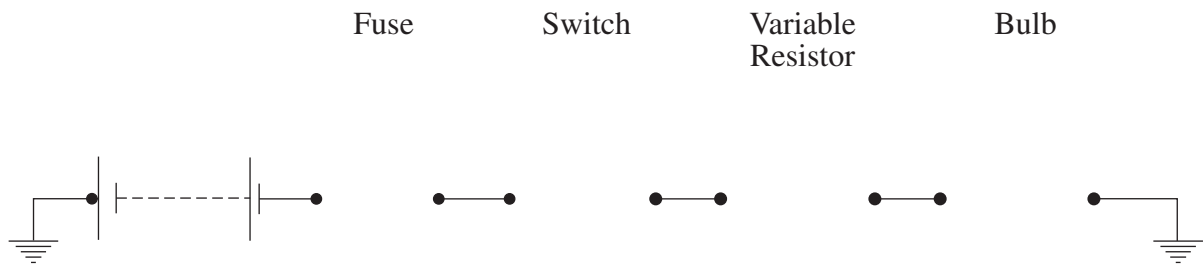
Section II (continued)

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Student Number

Question 19 (5 marks)

- (a) List the chemical composition of components found in a lead acid cell battery.
- | | | |
|-------|----------------------|---|
| (i) | Positive plate | 1 |
| (ii) | Negative plate | 1 |
| (iii) | Electrolyte | 1 |
- (b) Draw the appropriate symbols to complete the electrical circuit in the diagram below. 2



Question 20 (6 marks)

- (a) Describe how **THREE** lightweight materials have been used in the construction of modern motor vehicles to improve efficiency. **4**

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- (b) Touch-up paint is required on a vehicle. **1**

What information, located on the vehicle, identifies the correct colour?

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- (c) Which system on modern motor vehicles uses bright yellow coloured wiring and connectors as a caution to warn technicians? **1**

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Centre Number

Section II (continued)

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Student Number

Question 21 (6 marks)

The suspension on the front of a vehicle has been damaged, as shown in the diagram.



- (a) Describe the effects this damage may have on the suspension's components and the handling of the vehicle. 4

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Question 21 continues on page 16

Question 21 (continued)

(b) In an automotive workshop, water is coming through an air line.

2

How can this problem be rectified and managed?

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End of Question 21

Automotive

Section III

15 marks

Attempt Question 22

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 22 (15 marks)

Employers have the responsibility of providing a safe working environment. Employees also have a range of responsibilities in accordance with the *Occupational Health and Safety (OHS) Act (2000)* NSW.

Explain how you as an employee in an automotive workshop can ensure your compliance with the OHS Act.

Please turn over

Section IV

15 marks

Attempt Question 23

Allow about 25 minutes for this section

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

Question 23 (15 marks)

- (a) Describe the responsibilities that different government authorities have for ensuring that the automotive industry complies with environmental protection regulations and guidelines. **5**
- (b) Explain how and why an automotive workshop would deal with THREE of the environmental issues listed. Provide examples to support your answer. **10**
- Trade waste water
 - Waste (materials)
 - Hazardous materials (chemicals)
 - Air quality
 - Noise

End of paper