

Automotive Mechanical Technology

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 16–21
- Allow about 50 minutes for this section

Section III Pages 17–18

15 marks

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

Section IV Page 19

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 is the safest and simplest way for a person to move a box of oil filters weighing in excess of 25 kg?

 - (A) Use a block and tackle mechanism
 - (B) Push and slide the box to the desired location
 - (C) Lift the box with bent knees and a straight back
 - (D) Separate the contents into more manageable portions

- 2** Where should a safe operating procedure (SOP) be displayed?

 - (A) At the entrance to the workshop
 - (B) Where the procedure will take place
 - (C) Beside the WHS consumables cupboard
 - (D) Within the room where site inductions take place

- 3** Which level of training is required to gain an automotive vehicle repairer's licence in NSW?

 - (A) Certificate I
 - (B) Certificate II
 - (C) Certificate III
 - (D) Certificate IV

- 4** Which tyre size should be fitted to a 17 inch x $8\frac{1}{2}$ inch alloy wheel? (1 inch = 25.4 mm)

 - (A) 175 / 75R17
 - (B) 225 / 30R17
 - (C) 255 / 40R17
 - (D) 275 / 20R17

- 5 Which of the following actions would directly reduce a workshop's impact on the environment?
- (A) Offer quality service
 - (B) Use good quality parts
 - (C) Purchase supplies in bulk
 - (D) Perform regular workshop audits
- 6 What measurements are used when load testing a car battery?
- (A) Amps and volts
 - (B) Volts and watts
 - (C) Ohms and amps
 - (D) Amps and watts
- 7 What does the abbreviation MIG stand for in relation to MIG welding?
- (A) Metal inert gas
 - (B) Material influx gas
 - (C) Mild steel infusion gas
 - (D) Magnetic infiltration gas
- 8 A mechanical tool kit is shown.



This tool kit is typically used to remove which component?

- (A) Flexplate
- (B) Welch plug
- (C) Torque convertor
- (D) Harmonic balancer

- 9 What is the stoichiometric ratio for unleaded fuel?
- (A) 16.2 to 1
 (B) 14.7 to 1
 (C) 13.4 to 1
 (D) 12.5 to 1
- 10 Which tool should be used in the final stage of tightening a ‘torque to yield’ cylinder head bolt?
- (A) Torque bar
 (B) Impact gun
 (C) Angle gauge
 (D) Torque wrench
- 11 A compression test of a four-cylinder petrol engine has been carried out. The readings are as follows.

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
165 PSI	120 PSI	125 PSI	160 PSI

- What is the most likely cause of the compression difference between the four cylinders?
- (A) Worn piston rings
 (B) Burnt exhaust valve
 (C) Damaged head gasket
 (D) Worn valve stem seals
- 12 What is the primary purpose of a differential?
- (A) To maintain equal speed to the driving wheels
 (B) To provide equal torque to each driving wheel
 (C) To supply drive to the wheel with most traction
 (D) To allow the driving wheels to turn independently

- 13** When a clutch pedal is adjusted with insufficient free-travel, which of the following problems may be created?
- (A) Slipping clutch
 - (B) Dragging clutch
 - (C) Low clutch pedal
 - (D) Difficult gear selection
- 14** What is the most likely cause of bubbles appearing in the coolant of a car radiator?
- (A) The coolant mixture ratio is incorrect.
 - (B) The thermostat is stuck in the open position.
 - (C) Oil is starting to mix with coolant due to overheating.
 - (D) Cylinder compression is leaking past the head gasket.
- 15** Why should a steering wheel be locked when removing a steering rack?
- (A) To prevent damage to the clock spring
 - (B) To minimise wheel alignment problems
 - (C) To aid in re-connecting the steering to the rack
 - (D) To ensure correct operation of the steering column controls

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**Automotive
Mechanical Technology**

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Centre Number

Section II

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Student Number

35 marks

Attempt Questions 16–21

Allow about 50 minutes for this section

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

Question 16 (4 marks)

Ten litres of engine oil have been spilled on the workshop floor.

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Outline how to clean up and dispose of the waste.

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Question 17 (4 marks)

(a) Where should a workshop dispose of trade waste water? **1**

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(b) Outline TWO environmental consequences of incorrect trade waste disposal. **3**

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**Automotive
Mechanical Technology**

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Centre Number

Section II (continued)

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Student Number

Question 18 (3 marks)

All new vehicles registered in Australia need to be compliant with Australian Design Rules (ADR). **3**

What is the purpose of these rules?

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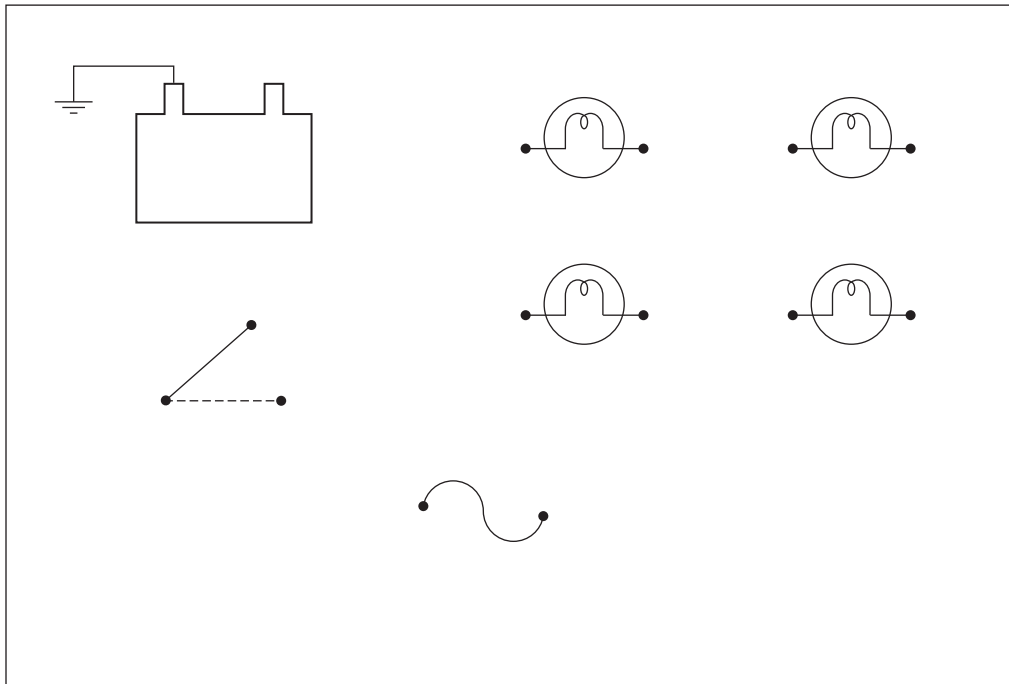
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Question 19 (7 marks)

- (a) Construct a parking light circuit in the box below, using all the symbols provided. **5**



- (b) Explain how you would use a voltmeter to test voltage drop to the parking/tail light circuit. **2**

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**Automotive
Mechanical Technology**

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Centre Number

Section II (continued)

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Student Number

Question 20 (8 marks)

- (a) Describe how the motor sport industry has influenced the development of vehicle brake technologies. **3**

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- (b) Explain how an anti-lock braking system (ABS) prevents wheel lock-up in emergency braking conditions. **5**

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**Automotive
Mechanical Technology**

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Centre Number

Section II (continued)

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Student Number

Question 21 (9 marks)

- (a) Why should a workshop vice be left with a gap between the jaws when it is not in use? **1**

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- (b) Under what circumstances should the drilling speed be changed on a pedestal drill? **2**

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- (c) What precautions should be observed when using an electric welder in the workplace? **2**

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Question 21 continues on page 16

Question 21 (continued)

- (d) Describe the advantages of using electric-powered tools compared with air-powered tools. **4**

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End of Question 21

**Automotive
Mechanical Technology**

Section III

15 marks

Attempt Question 22

Allow about 25 minutes for this section

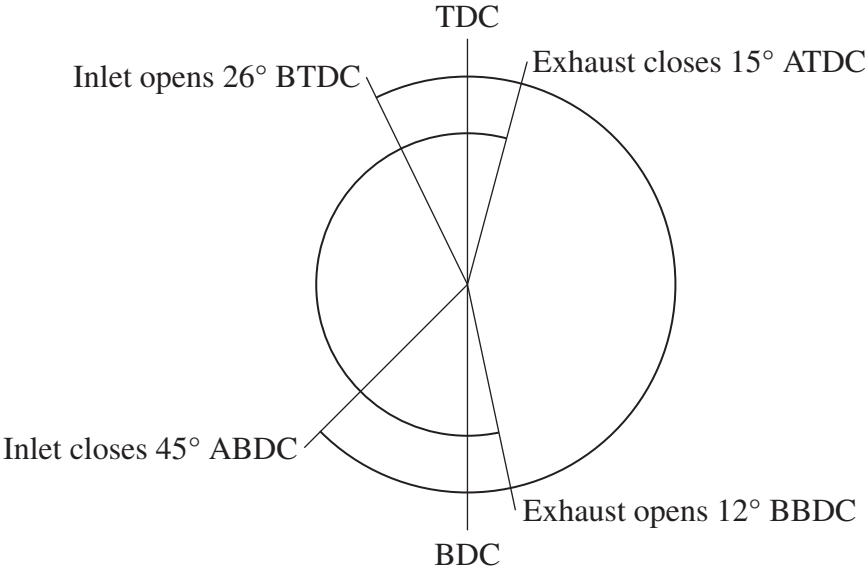
Answer the question in a writing booklet. Extra writing booklets are available.

Question 22 (15 marks)

Please turn over

Question 22 (15 marks)

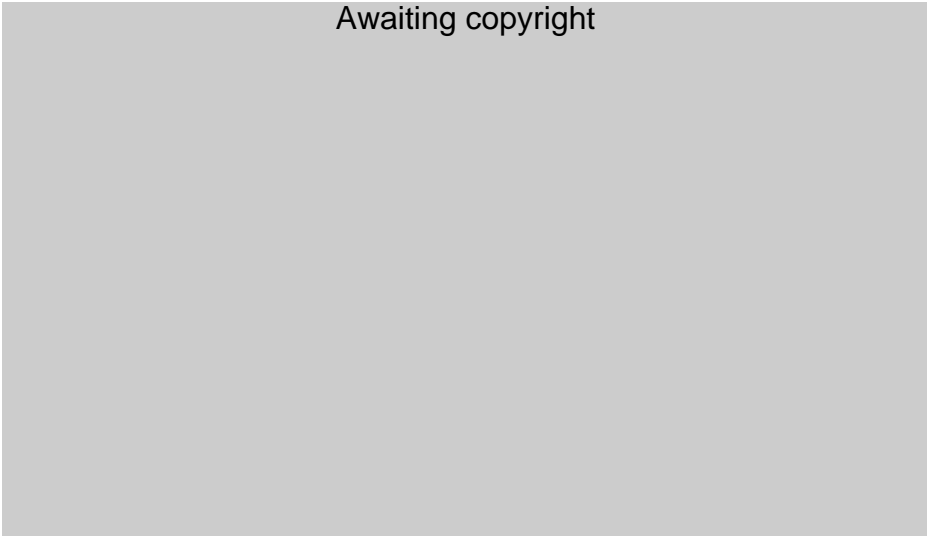
A camshaft timing diagram is shown.



- (a) How would a mechanic use the information obtained from this diagram? **3**

- (b) Why is it critical to ensure the valve/cam timing of a four-stroke engine is set up according to manufacturer's specifications? **4**

- (c) The over head cam (OHC) engine shown has had the cylinder head removed and refitted. **8**



Explain how you would set up the cam timing and adjust the valve clearances.

End of Question 22

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.

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 23 (15 marks)

Explain how businesses within the automotive repair industry are addressing the challenge of significant changes in technology, materials, repair techniques and of ensuring sustainable practice.

End of paper

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