

2015 HSC Automotive Mechanical Technology Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	D
2	B
3	C
4	B
5	C
6	A
7	A
8	D
9	B
10	C
11	C
12	D
13	A
14	D
15	A

Section II

Question 16

Criteria	Marks
<ul style="list-style-type: none"> • Correctly outlines how to clean up the oil using an industry accepted method • Identifies best-practice for disposing of the waste as per EPA guidelines • Uses precise industry-specific terminology 	4
<ul style="list-style-type: none"> • Outlines an acceptable method to clean up the oil • Identifies a method of disposal • Uses industry terminology 	2–3
<ul style="list-style-type: none"> • Outlines an acceptable method to either clean up the oil or dispose of the waste • Uses general terms 	1

Sample answer:

- Stop the source of the spill with absorbent material (DRI-SORB), from spill kit, build a bund to encircle the spill and stop the spread
- Slowly broom absorbent material inwards until spill is covered
- Shovel into plastic bag and place in spill kit bin
- Use bucket and mop to clean remainder.

Question 17 (a)

Criteria	Marks
<ul style="list-style-type: none"> • Correctly identifies where trade waste water should be disposed of 	1

Sample answer:

- Into a drain connected to water/oil separator.

Answers could include:

- Water to sewer, oil to pick up/recycle.

Question 17 (b)

Criteria	Marks
<ul style="list-style-type: none"> • Clearly outlines TWO environmental consequences relating to incorrect trade waste disposal • Demonstrates cause and effect between the incorrect disposal of trade waste and the associated damage to the environment • Uses industry-specific examples 	3
<ul style="list-style-type: none"> • Outlines at least ONE environmental consequence relating to incorrect trade waste disposal • Uses examples related to the industry 	2
<ul style="list-style-type: none"> • Outlines an environmental consequence relating to incorrect trade waste disposal • Uses general terms 	1

Sample answer:

Incorrect trade waste water disposal can lead to several major environmental consequences. If trade water is disposed at into storm water, the pollutants can cause problems to flora and fauna through polluting/contaminating local creek/river systems as well as the ocean. Furthermore, this can lead to soil contamination, which can cause problems for many years to come.

Answers could include:

- Fire danger
- Damage to environment due to storm water contamination of creeks and ocean
- Soil contamination
- Loss of value of recyclable materials
- Danger to personnel due to dust, vapour and odour.

Question 18

Criteria	Marks
<ul style="list-style-type: none">• Demonstrates a clear understanding of the purpose of Australian Design Rules (ADR)• Provides industry-specific examples to support the response• Uses industry terminology	3
<ul style="list-style-type: none">• Demonstrates some understanding of the purpose of Australian Design Rules (ADR)• Provides examples to support the response	2
<ul style="list-style-type: none">• Demonstrates a basic understanding of the purpose of Australian Design Rules (ADR)	1

Sample answer:

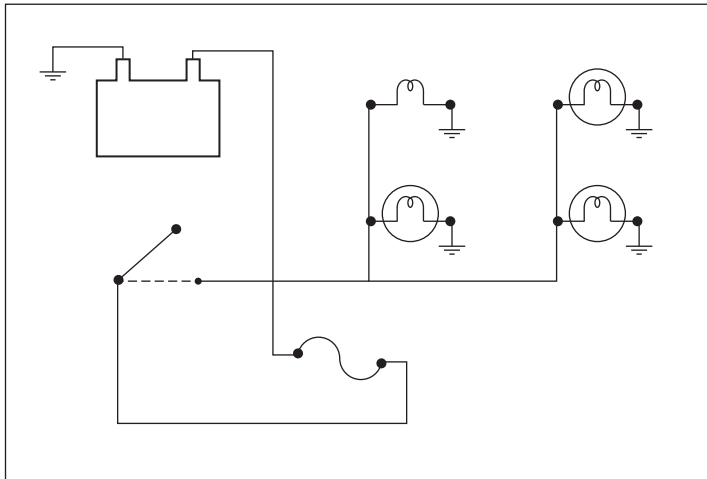
- ADR was implemented to ensure manufacturers comply with specific rules when manufacturing to improve vehicle safety and reliability. Aspects improved include:
 - Crash protection for driver/passenger
 - Restraint systems for child seats
 - Systems to reduce the threat of theft
 - Systems to reduce the threat of collision
 - Systems to reduce the threat of exhaust emissions
 - Systems to reduce the threat of operating noise.

Question 19 (a)

Criteria	Marks
<ul style="list-style-type: none"> The circuit has been connected correctly Earth symbol has been identified 	5
<ul style="list-style-type: none"> The circuit has been connected to form a complete circuit The lamp connection may be in series 	4
<ul style="list-style-type: none"> The wiring has been connected to all components The circuit is not functional 	3
<ul style="list-style-type: none"> The majority of components have been connected The circuit is not functional 	2
<ul style="list-style-type: none"> An attempt has been made to connect components 	1

Sample answer:

5 Marks



Question 19 (b)

Criteria	Marks
• Clearly explains how to determine voltage drop using a voltmeter	2
• Provides a general answer	1

Sample answer:

Measuring battery voltage and comparing readings to voltage supply to the light/load.

Connecting a voltmeter across two points of the circuit to test voltage drop.

Question 20 (a)

Criteria	Marks
<ul style="list-style-type: none"> • Develops a clear description of how the motorsport industry has influenced the development of brake technologies • Uses industry-specific examples • Uses precise industry-specific terminology 	3
<ul style="list-style-type: none"> • Develops a general description of how the motorsport industry has influenced the development of brake technologies • Uses related examples • Uses industry terminology 	2
<ul style="list-style-type: none"> • Demonstrates some link to how the motorsport industry has influenced the development of brake technologies 	1

Sample answer:

Motorsport puts greater stress on brake components than would be found in normal driving conditions. The performance of brakes relies on heat dissipation. Due to motorsport new vehicles have larger discs so surface area is increased. This also reduces the risk of brake fade due to overheating.

Answer could include:

Friction materials – Disc rotor materials, for example, ceramic/carbon pad materials with greater coefficient of friction.

Ease of service – Pad removal made easy and faster.

Question 20 (b)

Criteria	Marks
<ul style="list-style-type: none"> Develops a clear description of how Anti Lock Braking Systems operate in emergency situations Correctly identifies components of the system Uses precise industry-specific terms 	4–5
<ul style="list-style-type: none"> Develops a description of how Anti Lock Braking Systems operate in emergency situations Identifies some components of the system Uses some industry terms 	2–3
<ul style="list-style-type: none"> Develops a basic description of how Anti Lock Braking System operates in emergency situations Uses general terms 	1

Sample answer:

Each wheel hub is equipped with a sensor that monitors wheel rpm. If a wheel decelerates too quickly (beginning to lock) pressure in the hydraulic circuit to that wheel is momentarily reduced and the wheel can rotate.

Pressure in the hydraulic system to that wheel is returned by a pump in the ABS system. This sequence of events continues until the vehicle is almost stationary.

Question 21 (a)

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies why a vice should be left with an air gap between the jaws when not in use 	1

Sample answer:

The vice will contract as it cools. If the jaws are clamped shut it puts a large strain on the vice which may crack it.

Question 21 (b)

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies the circumstances when the RPM should be changed on a pedestal drill 	2
<ul style="list-style-type: none"> Identifies a circumstance when the RPM should be changed on a pedestal drill 	1

Sample answer:

Larger drill sizes need to spin slower than smaller drill sizes. When different materials are used, different speeds are necessary.

Question 21 (c)

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies the precautions that should be observed when using an electric welder in the workplace 	2
<ul style="list-style-type: none"> Identifies a precaution that should be observed when using an electric welder in the workplace 	1

Sample answer:

Precautions are correct PPE, ARC blinds, disconnect electronic devices such as computers, shield from heat and wet areas. Keep away from flammable materials and liquids.

Question 21 (d)

Criteria	Marks
<ul style="list-style-type: none"> Develops a clear description of the advantages of using electric powered tools compared with air powered tools Uses industry-specific terms Provides industry-specific examples 	4
<ul style="list-style-type: none"> Develops a general description of the advantages of using electric powered tools compared with air powered tools Uses industry-specific terms 	2–3
<ul style="list-style-type: none"> Develops a basic description of the advantages and disadvantages between using air powered tools and electric powered tools Uses general terms 	1

Sample answer:

Certain tools are only available in electric powered. Electric powered tools do not rely on compressors, air lines and fittings. They are less noisy and do not require oiling and draining of moisture. Electric tools if battery powered are lighter and easier to handle, they are portable, quieter and have a minimal risk for electric shock.

Disadvantage of battery powered tool is the battery discharges and they need time to recharge. Cord powered tools can produce trip hazards, suffer cord damage and can't be used in wet areas.

Section III

Question 22 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly identifies how a mechanic would use the information obtained from the diagram Makes links to how a mechanic would use the data Uses industry-specific terminology 	3
<ul style="list-style-type: none"> Identifies some of the ways a mechanic would use information obtained from the diagram Makes links to how a mechanic would use the data Uses industry terminology 	2
<ul style="list-style-type: none"> Makes a relevant point Uses general terms 	1

Answers could include:

A valve timing diagram gives a clear idea about the actual position of the piston during the opening and closing of inlet and exhaust valves in relation to piston position at TDC or BDC. This information is required if a mechanic needs to degree a camshaft of to improve engine performance.

Question 22 (b)

Criteria	Marks
<ul style="list-style-type: none"> Demonstrates a sound understanding of why it is critical to set up valve/cam timing to manufacturers' specifications Provides a technical response, supported by appropriate examples Uses precise industry-specific terminology 	4
<ul style="list-style-type: none"> Demonstrates an understanding of why it is critical to set up valve/cam timing to manufacturers' specifications Uses appropriate examples Uses precise industry-specific terminology 	2–3
<ul style="list-style-type: none"> Demonstrates a limited understanding of why it is critical to set up valve/cam timing to manufacturers' specifications Uses basic industry terminology 	1

Answers could include:

To prevent engine damage. To prevent bent valves, damage to pistons, to ensure motor turns freely, to ensure cam and crank pick up function correctly, to ensure engine breathes correctly, to ensure engine runs smoothly. To help reduce exhaust emissions. To ensure engine runs at the correct temperature. To prevent engine backfires to ensure compression ratio is correct.

Question 22 (c)

Criteria	Marks
<ul style="list-style-type: none"> Provides a detailed explanation for how to adjust the valve clearance and set up the cam timing Demonstrates a strong technical understanding of the procedures used Provides a logical and cohesive response Uses precise industry-specific terminology 	8
<ul style="list-style-type: none"> Provides a sound explanation for how to adjust the valve clearance and set up the cam timing Demonstrates a technical understanding of the procedures used Provides a logical response Uses appropriate industry-specific terminology 	6–7
<ul style="list-style-type: none"> Provides an explanation for how to adjust the valve clearance and set up the cam timing Demonstrates a basic technical understanding of the procedures used Uses industry terminology 	4–5
<ul style="list-style-type: none"> Provides a basic explanation for how to adjust the valve clearance and set up the cam timing Uses general terms 	2–3
<ul style="list-style-type: none"> Makes a relevant point 	1

Sample answer:

Cam timing is set by matching the marks on the crankshaft and camshaft sprockets to the bright links on the timing chain. Care should be taken not to rotate the crankshaft without the chain in place as damage to valve can occur.

Valve clearance is adjusted using a feeler strip, screwdriver and ring spanner with N°4 EX and IN on overlad (rocking) adjust N°I inlet EX by slackening lock nuts and turning screw just so feeler strip can be withdrawn with a slight drag tighten lock nut – recheck.

N°4 adjusted with N°I rocking

N°3 adjusted with N°2 rocking

N°2 adjusted with N°3 rocking

The valve timing can be checked, by confirming the valve timing events using a degree wheel. This involves bolting a degree wheel to a crank, and using a reference mark. The crank can be turned, and the valve opening/closing events should be matched to the manufacturer's specifications.

Section IV

Question 23

Criteria	Marks
<ul style="list-style-type: none"> Provides a highly detailed description of how the automotive industry is addressing the various challenges Demonstrates clear links between the challenges faced by the industry and ways the repair industry has adapted to the challenges Provides a detailed and cohesive response Use precise industry terminology 	13–15
<ul style="list-style-type: none"> Provides a sound description of how the automotive industry is addressing the various challenges Demonstrates links between the challenges faced by the industry and ways the repair industry has adapted to the challenges Provides a detailed response Uses sound industry-specific terminology 	10–12
<ul style="list-style-type: none"> Provides a description of how the automotive industry is addressing the various challenges Demonstrates some links between the challenges faced by the industry and ways the repair industry has adapted to the challenges Provides a descriptive response Uses industry terminology 	7–9
<ul style="list-style-type: none"> Provides a basic description of how the automotive industry is addressing the various challenges Demonstrates some relevant points Uses some industry terminology 	4–6
<ul style="list-style-type: none"> Provides a limited description of how the automotive industry is addressing the various challenges Uses general terms 	1–3

Answers could include:

- Businesses are having to retrain staff. Multi-skilling is becoming more important.
- Businesses are investing large sums of money in new tools and equipment.
- Businesses are needing to work closely with councils as well as EPA to help improve their sustainable practice.
- Outsourcing may be used as some repairs are becoming highly specialised.

Technology — Lane departure – adaptive cruise control – blind spot monitor – head-up display – reversing camera – brake assist.

Workplace requires advanced equipment to test. Service requires exact mounting for correct function.

Materials — Alloy components – high strength laminated steel in body structure – carbon fibre – plant-based plastics.

Repair tech — sealants/adhesives/riveting/welding body alignment.

Sustainability plant-based plastics used in body and trim materials – recyclable materials used in body. Longer periods between service.

2015 HSC Automotive Mechanical Technology Mapping Grid

Section I

Question	Marks	HSC content – focus area	Employability skills (Please put an X where appropriate)							
			Communication	Teamwork	Problem-solving	Initiative and enterprise	Planning and organising	Self-management	Learning	Technology
1	1	Common – WHS – AURAJA2002 – pg30			X		X	X		
2	1	Common – WHS – AURAJA2002 – pg30	X						X	
3	1	Common – Work effectively – AURAMA2001 – pg44							X	
4	1	Common – Solve Routine Problems – AURAF A2004 – pg39 and pg40			X			X	X	
5	1	Common – Environmental – AURAEA3003 – pg35			X		X			
6	1	Mechanical – Electrical fundamentals – AURETR1003 – pg56							X	X
7	1	Mechanical – Tools & equipment – AURTTK2002 – pg59	X						X	
8	1	Mechanical – Tools & Equipment – AURTTR2002 – pg59 Inspect & Service Engines – AURTTE2004 – pg60			X		X		X	
9	1	Mechanical – Automotive Mechanical Systems – AURLTA1001 – pg55							X	
10	1	Mechanical – Tools & Equipment – AURTTK2002 – pg59 Inspect & Service Engines – AURTTE2004 – pg60			X				X	X
11	1	Mechanical – Fault Finding – AURATA2001 – pg39-40 Inspect & Service Engines – AURTTE2004 – pg60			X			X	X	X
12	1	Mechanical – Mechanical Systems – AURLTA1001 – pg54-55			X				X	
13	1	Mechanical – Mechanical Systems – AURLTA1001 – pg54-55			X				X	

Question	Marks	HSC content – focus area	Employability skills (Please put an X where appropriate)							
			Communication	Teamwork	Problem-solving	Initiative and enterprise	Planning and organising	Self-management	Learning	Technology
14	1	Mechanical – Inspect & Service Engines – AURTTE2004 – pg60			X				X	X
15	1	Mechanical Systems – AURLTA1001 – pg54 and pg 55							X	X

Section II

Question	Marks	HSC content – focus area	Employability skills (Please put an X where appropriate)							
			Communication	Teamwork	Problem-solving	Initiative and enterprise	Planning and organising	Self-management	Learning	Technology
16	4	Common – Safety – AURAEA2002 – pg30 (risk management)			X		X	X		
17 (a)	1	Common – Environmental – AURAEA2002 – pg35 and pg 36 (ethical environmental practice)			X		X			
17 (b)	3	Common – Environmental – AURAEA2002 – pg35 (consequences to environment)							X	
18	3	Common – Communicate – AURAF2003 – pg43 and pg45 (interpret & convey)					X	X	X	
19 (a)	5	Common Stream – Electrical – AURETR1003 – pg56 (electrical fundamental)			X		X	X	X	X
19 (b)	2	Common – Troubleshooting – AURATA2001 – pg39 (conduct tests)			X		X			
20 (a)	3	Mechanical – Mechanical Systems – AURLTA1001 – pg55 (brake systems)							X	X
20 (b)	5	Mechanical – Mechanical Systems – AURLTA1001 – pg55 (brake systems)			X				X	X
21 (a)	1	Common Mechanical – Tools & Equipment – AURTTK2002 – pg59			X					
21 (b)	2	Common Mechanical – Tools & Equipment – AURTTK2002 – pg59	X		X		X	X	X	
21 (c)	2	Common – WHS – pg30					X		X	
21 (d)	4	Common Mechanical – Tools & Equipment – AURTTK2002 – pg59						X		X

Section III

Question	Marks	HSC content – focus area	Employability skills (Please put an X where appropriate)							
			Communication	Teamwork	Problem-solving	Initiative and enterprise	Planning and organising	Self-management	Learning	Technology
22 (a)	3	Mechanical – Mechanical Systems – AURLTA1001 – pg54-55 Mechanical – Inspect & Service Engines – AURTTE2004 – pg61	X		X				X	X
22 (b)	4	Mechanical – Mechanical Systems – AURLTA1001 – pg54-55 Mechanical – Inspect & Service Engines – AURTTE2004 – pg61			X				X	X
22 (c)	8	Mechanical – Mechanical Systems – AURLTA1001 – pg54-55 Mechanical – Inspect & Service Engines – AURTTE2004 – pg60			X		X	X	X	X

Section IV

Question	Marks	HSC content – focus area	Employability skills (Please put an X where appropriate)							
			Communication	Teamwork	Problem-solving	Initiative and enterprise	Planning and organising	Self-management	Learning	Technology
23	15	Common – Communicate in an auto workplace – AURFAA2003 – pg44 and pg47 Common – Sustainability (environmentally sustainable work practices) – pg35 and pg36			X				X	X