

2022 HSC Automotive Vehicle Body Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 16 (a)

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies the lifting point 	1

Answers could include:

- On the jacking points
- On the chassis rails
- On the sill panel.

Question 16 (b)

Criteria	Marks
<ul style="list-style-type: none"> Clearly outlines relevant safety checks Uses correct industry terminology 	3
<ul style="list-style-type: none"> Demonstrates some understanding of safety checks 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

Eye, foot and clothing protection must be worn when working under the hoist. Ensure the vehicle weight does not exceed the hoist SWL. Ensure that the vehicle is correctly positioned. Check the condition of the hoist lift pads. Only place the hoist lifting arm pads on the vehicle lifting points as recommended by the vehicle manufacturer.

Question 17 (a)

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies the main recyclable component of a 12 V battery 	1

Sample answer:

Lead

Question 17 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides a clear description of how electric vehicles will affect environmental sustainability practices in the automotive workshop Uses accurate industry terminology 	4
<ul style="list-style-type: none"> Provides some description of how electric vehicles will affect environmental sustainability practices in the automotive workshop Uses industry terminology 	3
<ul style="list-style-type: none"> Demonstrates some information about how electric vehicles will affect environmental sustainability practices in the automotive workshop Uses some industry terminology 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

Electric vehicles do not require regular oil changes therefore less oil will be required and less waste oil will need to be stored and recycled.

There will be fewer parts required for servicing, eg oil and fuel filters will not need to be changed. This will also lead to less packaging and less waste.

There will be less wear on serviceable items such as brake pads, leading to longer service intervals and less waste.

Question 18 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly outlines a correct fault Uses correct industry terminology 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Answers could include:

- Worn or damaged teeth on third gear
- Worn bearing on third gear
- Excessive gear end float.

Question 18 (b)

Criteria	Marks
<ul style="list-style-type: none"> Clearly describes the process to troubleshoot a driveline noise Uses correct industry terminology 	4
<ul style="list-style-type: none"> Provides some description of how to troubleshoot a driveline noise Uses some industry terminology 	2–3
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

Gather more information from the customer using open questions to isolate conditions where symptoms occur. Road test the vehicle to identify the fault. Check the driveline for excessive free play as well as a visual inspection for wear or damage. Use diagnostic equipment such as stethoscope or chassis ear to identify noise.

Question 19 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly identifies TWO body panels used as a reference for correct alignment 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

The sill panel and the rear quarter panel.

Question 19 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides a thorough explanation of how a vehicle door can be adjusted on the hinge during alignment Uses accurate industry terminology 	3
<ul style="list-style-type: none"> Provides some explanation of how a vehicle door can be adjusted on the hinge during alignment Uses some industry terminology 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Answers could include:

When adjusting a vehicle door on a hinge during alignment, move the hinge forward and backward. Then continue to move the hinge up and down and then in and out until the door closes securely and is back in alignment.

Question 20 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly describes the back masking method when preparing a vehicle for application of primer and how this method eliminates a hard-taped line Uses accurate industry terminology 	3
<ul style="list-style-type: none"> Provides a basic outline of the back masking method when preparing a vehicle for application of primer Uses industry terminology 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

When back masking the masking paper is applied to cover the area to be primed, and then folded over on itself.

This causes the paper to make a slight roll that eliminates a hard taped line.

Question 20 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides a clear description of advantages of back masking Uses accurate industry terminology 	4
<ul style="list-style-type: none"> Provides a description of advantages of back masking Uses some industry terminology 	2–3
<ul style="list-style-type: none"> Provides a limited description of advantages of back masking 	1

Sample answer:

The advantage of the back masking method is it prevents a hard tape line and overspray in unwanted areas. This makes sanding operations easier and prevents heavy build-up of primer on repair edge, eliminating the need to prime the entire panel. This results in a reduction in the cost of materials.

Question 21 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly identifies why a circuit breaker would be used rather than a fuse 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

A circuit breaker is a permanent part of a circuit. It breaks the circuit when there is excess current flow and can be reset automatically whereas a fuse is a single use item.

Question 21 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides a thorough explanation of why current is different for the two applications Uses Ohm's law correctly to support the answer Uses accurate industry terminology Provides a logical and cohesive response 	5–6
<ul style="list-style-type: none"> Provides a sound explanation of why current is different for the two applications Uses Ohm's law correctly to support the answer Uses industry terminology Provides a logical and cohesive response 	3–4
<ul style="list-style-type: none"> Demonstrates some explanation of why current is different for the two applications Uses Ohm's law to support the answer Uses some industry terminology 	2
<ul style="list-style-type: none"> Provides some relevant information 	1

Sample answer:

Wiring and fuse specifications differ when different voltages are applied for the same power output because as voltage is increased, according to Ohm's law, current is decreased. For example 100 watts divided by 12 volts equals 8.3 amps. When 100 watts is divided by 24 volts this equals 4.2 amps. This demonstrates that double the voltage halves the current for the same power rating.

In a 12-volt vehicle the wiring must be suitable to carry up to 10 amps. This would usually require the use of a larger cable than for a 24 volt circuit, suitable for this current, and a fuse rating of approximately 15 amps.

In a 24-volt vehicle only 4 amps is used in the 100 watt light application. This will require smaller wiring size than for the 12 volt circuit, suitable for this current, with a fuse rating of approximately 10 amps.

Section III

Question 22 (a)

Criteria	Marks
<ul style="list-style-type: none"> • Clearly describes the operation of a spray booth • Provides a logical and cohesive response • Uses correct industry terminology 	5
<ul style="list-style-type: none"> • Provides some description of the operation of a spray booth • Provides a logical response • Uses some industry terminology 	3–4
<ul style="list-style-type: none"> • Provides a limited response about the operation of a spray booth 	2
<ul style="list-style-type: none"> • Provides some relevant information 	1

Answers could include:

Spray booths protect all employees in the workshop from hazardous paint vapours by providing a controlled environment where paint vapours and solvents and gases are contained in the spray booth during spraying operations.

These vapours are then passed through the spray booth filtration systems removing overspray that could settle on vehicles outside the workshop as it is removed by the spray booth exhaust system.

The spray booth also provides the operator with a clean spraying environment that minimises, through its filtration system, dust and dirt particles that could contaminate the surface of the article being primed.

The spray booth also provides excellent lighting, fire safety. Temperature control assist in the curing of the primer, allowing faster drying time of the primer through the baking function, leading to increased productivity.

Question 22 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides a detailed explanation of the processes and procedures Provides a logical and cohesive response Uses correct industry terminology 	9–10
<ul style="list-style-type: none"> Provides a sound explanation of the processes and procedures Provides a logical response Uses some industry terminology 	7–8
<ul style="list-style-type: none"> Provides some explanation of some processes and procedures Uses limited industry terminology 	5–6
<ul style="list-style-type: none"> Provides a basic explanation of some processes and procedures 	3–4
<ul style="list-style-type: none"> Provides some relevant information 	1–2

Answers could include:

The processes and procedures to be followed for the application of a wet-on-wet primer require the panel to be:

- Inspected for any damage such as small dents, chips and/or scratches
- Thoroughly cleaned using wax and grease remover/prepsol, once again checking closely for any damage
- Sanded using red scotch brite and P320 dry or P400 wet for edges of panel followed by sanding front of panel with P320 dry by hand using a sanding block or machine sanding process or P400 wet by hand using a sanding block until de-glazing of surface is achieved
- Cleaned using compressed air and cleaned again using wax and grease remover/prepsol after sanding operations
- Tac-ragged to remove fine dust particles
- Wet-on-wet primer should be mixed to manufacturer's recommended mixing ratios
- A second coat can be applied after first coat has dried to a matt finish (egg-shelled) approx. 5–10 minutes
- After second coat of wet-on-wet primer has dried to a matt finish (egg-shelled) approx. 5–10 minutes any dirt or nibs in primer can be lightly sanded using P500 dry sandpaper or P500 sanding sponge then lightly tac-rag panel to remove any sanding dust from sanding operations and panel is ready for application of colour coats.

Section IV

Question 23

Criteria	Marks
<ul style="list-style-type: none"> Provides a comprehensive explanation of how newer technologies will affect diagnosis and repair in the automotive industry Uses a wide range of examples Uses correct industry terminology 	13–15
<ul style="list-style-type: none"> Provides a sound explanation of how newer technologies will affect diagnosis and repair in the automotive industry Provides a detailed response Uses industry terminology 	10–12
<ul style="list-style-type: none"> Provides an explanation of how newer technologies will affect diagnosis and repair in the automotive industry Provides a detailed response Uses industry terminology 	7–9
<ul style="list-style-type: none"> Provides limited information on how newer technologies will reduce emissions with some linking to diagnosis and repair Provides a basic response Uses industry terminology 	4–6
<ul style="list-style-type: none"> Provides some information on how newer technologies will reduce emissions with some linking to diagnosis and repair 	1–3

Answers could include:

Changes in technology for the automotive industry are significant.

These changes relate to:

- Repair workshops
- Equipment
- Training
- Licences
- Safety.

Repair workshops

These changes have both positive and negative effects on repair workshops when diagnosing a vehicle fault while the vehicle is running in the workshop. In internal combustion engines (ICE) care must be taken to ensure that any dangerous fumes are extracted, noise must be limited or controlled, hot surfaces and moving parts are dangerous and need to be identified and safety procedures applied.

Zero-emission vehicles do not have hot or moving parts, are silent and do not emit dangerous fumes. Workshops will be a much more pleasant environment to work in. However, most zero-emission vehicles use many small batteries in a large arrangement which is very dangerous if it catches fire. These fires cannot be extinguished and need to be allowed to burn out. Workshops need to provide a specific dedicated area where these vehicles are moved to allow this to happen safely. This area cannot be used for any other purpose and is unproductive. This adds a significant cost to the workshop. The service intervals and parts replacement are significantly less than in ICE vehicles which will affect the

size of the workforce. Diagnostic equipment will need to be purchased as these vehicles are so different in their operation, repair and diagnosis.

Equipment

Significant investment in new equipment for isolation, diagnosis and repair will be necessary to be able to service, maintain and repair due to the significant difference in power train for zero-emissions vehicles. Dismantling and repairing electric motors are significantly different processes compared to ICE engines.

Training

Zero-emission vehicles such as EVs and hydrogen fuel cell are significantly different in operation and diagnosis compared to ICE. New qualifications and licences are required to meet currency standards for these vehicles. Staff will need to attend courses to attain the necessary qualifications to perform the required diagnosis and repairs.

Licences

As these vehicles use high voltages which are much higher and more dangerous than household voltages (which require a licence) this industry will be more regulated and the need for specific and current licensing will be necessary. This licence will also be tied to regular training and proof that staff are safe and competent. This will be a significant cost to businesses and staff.

Safety

New processes for making zero-emission vehicles safe need to be implemented for:

- Isolation of vehicles on fire
- New processes to be implemented for emergency procedures
- Identification and training of disconnect procedures for all vehicles
- Implementation of training for first responders in an emergency situation
- The regular replacement of tools that have a use-by date when working with high voltages.

Overall the changes needed to be implemented in the automotive industry are expensive, and in some cases not possible. This may cause some workshops to close due to the issues discussed above, staff to leave the industry and the need to identify new staff willing to work on new technology. This poses a significant challenge to many aspects of the industry.

2022 HSC Automotive Vehicle Body Mapping Grid

Section I

Question	Marks	HSC content — focus area
1	1	Safety — safe work procedures and practices – page 29
2	1	Use and maintain tools and equipment in an automotive workplace — tools and equipment – page 52
3	1	Working in the automotive industry and workplace — working in the industry – page 40
4	1	Apply refinishing primers to vehicle surfaces — cleaning components – pages 61–62
5	1	Apply refinishing primers to vehicle surfaces — surface preparation for paint repairs – page 62
6	1	Safety — risk management – page 29
7	1	Apply refinishing primers to vehicle surfaces — surface preparation for paint repairs – page 62
8	1	Troubleshooting and problem-solving — troubleshooting processes – page 36
9	1	Apply refinishing primers to vehicle surfaces — work tasks pre repair vehicle body operations – page 60
10	1	Apply refinishing primers to vehicle surfaces — surface preparation for paint repairs – page 62
11	1	Apply refinishing primers to vehicle surfaces — pre repair body operations and paint repairs preparation – page 60
12	1	Remove and store vehicle body components — replacement – page 61
13	1	Apply refinishing primers to vehicle surfaces — surface preparation for paint repairs – page 62
14	1	Electrical fundamentals — electrical circuit (basic) – page 57
15	1	Sustainability — environmentally sustainable work practices – page 34

Section II

Question	Marks	HSC content — focus area
16 (a)	1	Safety — safe work procedures and practices – page 29
16 (b)	3	Safety — safe work procedures and practices – page 29
17 (a)	1	Sustainability — environmental issues and sustainability – page 33
17 (b)	4	Sustainability — environmental issues and sustainability – page 34
18 (a)	2	Troubleshooting and problem-solving — troubleshooting processes – page 36
18 (b)	4	Troubleshooting and problem-solving — troubleshooting processes – page 36
19 (a)	2	Remove and store vehicle body components — replacement – page 61
19 (b)	3	Remove and store vehicle body components — replacement – page 61
20 (a)	3	Apply refinishing primers to vehicle surfaces — application of primers – page 63
20 (b)	4	Apply refinishing primers to vehicle surfaces — application of primers – page 63
21 (a)	2	Electrical fundamentals — electrical circuit (basic) – page 57

Question	Marks	HSC content — focus area
21 (b)	6	Electrical fundamentals — electrical circuit (basic) – page 57

Section III

Question	Marks	HSC content — focus area
22 (a)	5	Use and maintain tools and equipment — operation of automotive tools and equipment – pages 59–60
22 (b)	10	Apply vehicle refinishing primers to surfaces — re-finishing primed surfaces – page 63

Section IV

Question	Marks	HSC content — focus area
23	15	Working in the industry — nature of the industry – page 40