



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

## **2012 HSC Automotive 'Sample Answers'**

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

## Section II

### Question 16

*Answers could include:*

<i>Tool</i>	<i>Tool name</i>	<i>Example of use</i>
A	Impact screwdriver	For undoing extremely tight screws in many automotive applications
B	Dial gauge	Checking runout, distortion, axial movement, end float etc

### Question 17

*Sample answer:*

The battery case should be visually inspected for damage or leaks. The battery terminals should also be inspected for damage.

The battery should be tested for state of charge using a hydrometer. The hydrometer reading should be above 1.220 specific gravity or half-charged before load testing. A consistency of no more than 50 points in hydrometer readings between cells will indicate an acceptable battery load testing.

When load testing the battery a carbon pile load tester is used. The current or amps value used in this test should be half cold cranking amps indicated on the battery for no longer than fifteen seconds. During this time the terminal voltage should not fall below 9.6 volts. Cells should be observed for excessive gassing and discolouration. If this is observed then the battery is faulty.

If all cells are reading below 1.220 specific gravity, the battery should be charged before load testing. The battery should be replaced if the voltage falls below 9.6 volts during load test.

When using an electronic battery tester, all relevant battery information should be entered before testing.

**Question 18 (a)*****Sample answer:***

- (i) Input (gearbox) shaft
- (ii) Clutch fork
- (iii) Pressure plate
- (iv) Clutch plate
- (v) Flywheel

**Question 18 (b)*****Sample answer:***

Disengagement – When the clutch pedal is depressed the release bearing will force the pressure plate spring to disengage the pressure plate off the clutch plate. This will allow slippage between the engine and gearbox and no torque from the engine can be transferred to the gearbox.

Engagement – When the clutch pedal is released the pressure plate spring will force the pressure plate to hold the clutch plate firmly against the flywheel. The clutch plate is splined to the input shaft hence this will allow engine torque to be transferred to the gearbox via the input shaft.

**Question 18 (c)*****Sample answer:***

1. Brake caliper
2. Brake disc
3. Brake lines
4. Brake drum
5. Brake booster
6. Brake master cylinder

When the driver presses on the brake pedal the effort is assisted by the brake booster. This force is now transmitted to the master cylinder which applies hydraulic pressure via the brake lines to the brake assemblies at each wheel.

The brake caliper clamps the disc. The brake shoes press against the inside of the drum. This creates friction and slows the vehicle.

**Question 19 (a)*****Answers could include:***

Serpentine belt  
OR  
Multi-ribbed belt  
OR  
Multi 'V' ribbed belt

**Question 19 (b)*****Answers could include:***

Components may include: alternator, power steering pump, water pump, air conditioning compressor, air pump, supercharger

**Question 19 (c)*****Sample answer:***

Remove the belt and re-start engine. If the noise disappears this indicates that one of the driven component bearings is faulty. You would then physically examine each bearing by spinning them by hand and checking for excessive play to isolate the fault to a component.

Alternatively, you could use a stethoscope and check each driven component with the belt fitted and the engine running. You would then remove the drive belt and physically check the component to confirm the fault.

**Question 20*****Sample answer:***

Workshops should organise both hazardous materials and waste products by ensuring that:

- Liquid products such as petrol, thinners, kerosene, etc are stored in containers that are correctly labelled and stored in designated flammable liquid storing cabinets
- Oils and lubricants should be stored in a bunded area to prevent run-off into waterways in the case of leaks. They should be disposed of by contacting an authorised waste recycler
- Trade waste water should be treated through a water/oil separator before being discharged into the sewer
- Recyclable materials such as trade waste scrap metal, old batteries, tyres and other materials should be separated from other waste products when stored and disposed of correctly by contacting a relevant waste collection company.

## Question 21

### *Sample answer:*

Skills development may include:

Skills could further be developed through higher-level qualifications such as Certificate IV in Automotive Technology and above at the completion of your apprenticeship or traineeship.

Other options may include cross-trade training. For example, motor mechanics may complete a vehicle body repair qualification. This will make you more employable and provide more employment opportunities. For workers working in the dealership sector product-specific training is made available in both technical and management. Industry associations such as the IAME, Repco AutoTech and Bosch provide industry-specific training on new emerging technologies. This will ensure currency and allow upgrading of skill levels.

## Section III

### Question 22

#### *Answers could include:*

ABS controls wheel speed under emergency braking situations by controlling the pressure to the braking system. Individual wheel speed can be controlled, allowing the driver to remain in control and steer the vehicle in this emergency situation.

Stability control actively intervenes by applying pressure to shock absorbers to control vehicle body movement. Some vehicles intervene in the steering system to prevent oversteer and understeer.

Run flat tyres are designed to perform and give the driver control of the vehicle even though the tyre is flat. This is achieved by adding strength to the side walls of the tyre. Systems that are incorporated to improve driver awareness are: anti-collision early warning, reversing sensors, daytime driving lamps, on-board dash warning systems.

## Section IV

### Question 23 (a)

*Sample answer:*

The workshop illustrated presents a range of concerns relating to safety. Many issues deviate quite significantly from what is considered best working practice, and the workshop would require various changes in order to restore the working environment to an acceptable standard.

Some issues which can be discussed are:

- The relocation of heavy items to ensure that they are not stored above head height
- The placement of machinery in positions within the workshop to remove the need for power leads to be extending across the workshop. Where appropriate, power leads can extend from above
- The relocation of hazardous chemicals to a bunded area, as the image depicts oil dispensed on the floor, which is an unacceptable slip hazard
- An improved maintenance schedule is required to resolve issues such as the broken window as well as the overflowing bin
- Improved storage solutions are needed to remove the various trip hazards
- Chemicals should be stored in a suitable steel Flammable Liquids cupboard
- Rags should be placed in a bin specifically designed for disposal of oily rags, as these present risk of spontaneous combustion.

**Question 23 (b)*****Sample answer:***

- Business profitability and service to clients

The workshop does not present a good business image because of clutter and mess. A customer could see this as being highly unprofessional. If the workshop is messy one could wonder what quality of workmanship will be done to the vehicle being repaired. There is also a possibility of the wrong fluid being used in the vehicle because of the lack of organisation in the workshop. This shows a careless attitude towards work.

By running a workshop in this manner, it is likely that the company would develop a poor reputation, and be perceived as being disorganised, which could translate into fewer customers. Furthermore, the disorganised nature of the workshop may lead to increased running costs for the business. Repair time will likely increase due to staff inability to locate the correct tools and equipment, which will affect workshop productivity and efficiency. Also, injuries to workers are likely to be increased due to the unsafe nature of the workshop, which may increase insurance overheads as well as staff down-time.

- Environment

The workshop presents several major concerns for the environment, which are illustrated by:

- spilt oil reasonably close to the stormwater drain
- overflowing bins
- many fluid bottles with no labels so contents cannot be correctly identified
- fluids which may be toxic to the environment
- batteries are stored right next to the drain which could cause serious risk to stormwater run-off.

Many of these issues can be resolved by re-designing the workspace to include a suitable bunded area, flammable storage cupboards, flammables bin, relocation of the drain as well as placement of batteries in the bunded area.