



NZQA accredited and registered provider

Unit Standard 21672

PRACTICE PAPER - ANSWER BANK

Assessors Note:

This answer bank should be used as the primary resource when marking students work. However, responses to some questions may be subjective and tutors are advised to exercise their professional judgement when making assessment decisions.

ELEMENT ONE

Demonstrate knowledge of factors affecting vehicle technology changes.

- 1. The New Zealand Transport Agency sets rules to ensure that all vehicles on our roads are safe for use and do not harm the environment. Complete the table by explaining how vehicle manufacturers have responded to each of the following sets of rules:**

Vehicle safety rules	In response to vehicle safety rules manufacturers have introduced technology such as ABS, traction control, ride stability, active suspension and emergency brake assist. These systems are designed to improve vehicle handling and control.
Environment	In response to environment safety rules manufacturers have introduced technology such as electronic management systems and engines that can be powered using more environmentally friendly fuels. This technology is designed to lower harmful vehicle emissions.
Occupant protection	In response to occupant protection rules manufacturers have introduced technology such as air bags, protective glass, crumple zones and seat belt pre-tensioners. This technology is designed to protect vehicle occupants in the event of collision.

- 2. Explain how political pressure may have encouraged vehicle manufacturers to introduce air bags and ABS.**

Vehicle manufacturers need to be aware of the political environment in which they are operating. Typically political parties will have their own transport policy that they would like to put into place. This may involve placing tougher controls on imported vehicles, reducing emission levels or raising taxes on fuel. All of these can potentially impact vehicle sales.

Also, with the high costs associated with vehicle accidents governments regularly look at new rules to force vehicle manufacturers to produce safer vehicles.

3. Explain how social pressure may have encouraged vehicle manufacturers to introduce navigation systems.

In recent years the numbers of vehicles on our roads has increased significantly as vehicles have become more affordable, roads have improved and more people are working.

This has led to a much more mobile society where many households now have two or even three vehicles at their disposal.

With this increase in vehicles comes increased traffic and time spent in cars. In response to this vehicle manufacturers are now producing vehicles that are more comfortable, have better entertainment options and are equipped with technology such as cruise control and navigation systems all in effort to make life easier for the vehicle occupants.

4. Explain how economic pressure may have encouraged vehicle manufacturers to reduce the production of larger vehicles in favour of smaller more compact vehicles.

With the increase in traffic, the rising costs of fuel and population the demand for smaller more fuel efficient cars has increased. In response to this vehicle manufacturers are switching focus to smaller more affordable vehicles.

5. Explain how environmental pressure may have encouraged vehicle manufacturers to introduce exhaust gas sensors and catalytic converters.

Modern car buyers are far more conscious of the environment when deciding on which vehicle to purchase than in previous generations. Governments have also become more aware and have introduced a range of laws to protect the environment.

In response to this vehicle manufacturers have made improvements to exhaust emissions systems and are exploring the use of more environmentally friendly fuels and construction materials.

6. Explain how infrastructural pressure may have encouraged vehicle manufacturers to introduce dynamic stability and traction control.

Infrastructure relates to the roads on which vehicles are driven and the services that are available to support road users. In recent years there have been significant improvements to the quality of the roads in New Zealand. This has contributed to the increase in vehicles using the roads and increases in distances travel.

The introduction of multi lane motorways has allowed vehicles to travel at higher speeds; however this has contributed to an increase in more serious accidents.

In response to this vehicle manufacturers are now producing vehicles that are safer by using technology such as air bags, ABS, dynamic stability control and traction control systems.

ELEMENT TWO

Demonstrate knowledge of new and emerging technology in the motor industry.

1. Complete the table by providing a brief description of each of the following fuels.

LPG	A clear and colourless liquid refined from crude oil. Can only be used in vehicles with the correct set up.
Hydrogen	Uses a fuel cell to create electricity without going through a combustion process. They produce excellent energy with very low emissions.
Bio-diesel	A liquid fuel that is refined from animal fats or plant oils. It is non toxic and is becoming commonly used to fuel buses and commercial vehicles.
Petrol	Is the most common automotive fuel, it is highly flammable and produces harmful exhaust emissions.
Ethanol	Can be made using sugar cane or corn. It burns clean; however it can be corrosive.
Diesel	Second most popular fuel used in cars on New Zealand roads. Used in compression ignition engines.
Methanol	Provides greater power than petrol and is used in motor sports.
LNG	Is a natural gas that has been converted into a liquid and is stored in a cylinder for ease of transport.
Electric	Powered using rechargeable batteries and produce no fumes or noise. However it has a limited driving range.
Hybrid	Powered using a combination of an electric motor and a combustion engine.
CNG	Is a natural gas that is lighter than air and is stored under high pressure.

2. Complete the table by providing a reason why each material is used and where on the vehicle is it used when constructing vehicles.

Material	Reason for use	Where used
Steel alloy	Used due its high impact strength and low weight properties.	Chassis rails, front and rear impact frames and body panels.
Aluminium alloy	Used due to its light, soft, malleable, ductile and corrosion resistance properties.	Cross members and wheels
Composite materials	Used due to its safety properties	Bumpers
Hard interior trim	Used due to its ultra violet resistance qualities	Dash panel
Soft interior trim	Used due to its fire retardant properties	Seats

3. Provide a brief description of each of the following technology systems.

Seat belt pretensioners

These systems automatically remove seatbelt slack in the event of a crash. They can be mechanically, electrically or pyrotechnically operated.

Reverse camera system

This system uses sensors to detect obstacles when reversing the vehicle. Where an obstacle is detected an audible warning is raised.

4. For each of the following provide a brief description of how modern systems have improved on older systems.

Engines	Lighter weight in construction, smaller in size and cheaper to manufacture. They have better fuel efficiency, are quieter when running, more environmentally friendly with lower emissions, improved reliability and lower servicing costs
Transmission	Have better fuel economy, with reduced wear on drive-train components, have increased driver comfort and wider gear selection options.
Suspensions	More suspensions developments include active systems that automatically adjust suspension to best suit road conditions. Improves handling and a result safety of the vehicle.
Fuel	Use systems such as common rail to achieve better fuel economy and efficiency, to lower emissions, and to improve engine performance and reliability.
Braking	There are several enhancements to braking systems that have improved braking performance significantly. These improvements include ABS, EBA and EBD. All these systems use electronic components in activating the brakes

5. For each of the following name the system that is described.

System designed to detect and automatically compensate for loss of control.
Uses brakes and throttle to maintain vehicle control.

Ride stability

System that automatically responds to changes in road conditions and surfaces by changing spring compression rate and damper stiffness.

Active suspension

System designed to prevent the driven wheels from spinning during acceleration.

Traction Control

System designed to prevent wheel lock up.

ABS

6. List any Three improvements that manufacturers have introduced to make the driver and passenger more secure when inside the vehicle.

Air bags
Seatbelt pretensioners
Crumple zones
Active head restraints
Side impact bars
Occupation safety protection cell

7. Explain the difference between active and passive systems.

Active systems are designed to prevent accidents, while passive systems respond in the event of an accident

8. List THREE active safety systems.

1. ABS brakes
2. Traction control
3. Auto collision warnings
4. Blind spot safety warnings
5. Lane departure warnings
6. Directional headlights
7. Reverse sensing systems

9. Briefly explain how ECUs can help to achieve safer vehicles on our roads.

The instant responses achieved through the use of ECUs and sensors greatly increase response times and improves vehicle handling. Systems as ABS, traction control and air bags have made significant safety improvements.

10. Complete the table by explaining how new technology impacts on each area.

Tooling and equipment	<p>With the introduction of more advanced technology, particularly with electronic and computer systems servicing tools and equipment are increasingly becoming more complex and specialised.</p> <p>In fact, several new model vehicles have their own specialised tools and equipment for carrying out service repairs. These tools and equipment tend to be quite expensive and staff using them need to be properly trained in their use.</p> <p>This trend is likely to result in more vehicles having to be serviced in dealership environments rather than in general automotive workshops, as its unlikely that general workshops will have the tools, equipment and trained staff available.</p>
Staff	<p>Staff working within the automotive industry need to undertake ongoing training to remain up-to-date with new technology. Computer and diagnostic skills are becoming more relevant with specialisation a growing trend. The traditional role of automotive mechanic has changed significantly in recent years and will continue to do so. It is likely that workshop supervisors will employ staff who are more technically qualified.</p>
Shop Layout	<p>With the introduction of computer diagnostic equipment in workshops it is now necessary to consider computer cabling and networking when designing workshop layout. Given the expensive nature of this type of equipment workshop security becomes another important consideration.</p>
Company procedures	<p>With new technology it is likely that companies will need to monitor their procedures for recruitment and training of staff to reflect the ongoing changing work demands. There will also need to be systems in place to provide access for staff to training materials and service information.</p>

11. List Four sources of information that technicians can access to keep up to date with new technology.

Service bulletins
Workshop vehicle manuals
Internet
Trade magazines
Industry training courses
Industry training provider