FEDS FAIRVIEW EDUCATIONAL SERVICES LTD

NZQA accredited and registered provider

Unit Standard 30436

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 petrol as an automotive fuel.

1. Complete the table for the most popular petrol that is sold in New Zealand.

	Grade	Rating	Colour
Petrol 1	Regular	91	Red/purple
Petrol 2	Super / Premium	95/96	Yellow/Orange

2. Describe the main differences between 91 and 96 graded petrol.

96 graded petrol can withstand higher levels of heat and compression before combustion than a 91 graded petrol. 96 is used for high compression engines, while 91 is used for low compression engines.

3. Why is upper cylinder lubricant used as an additive in petrol?

To lubricate the upper cylinder components to minimise wear and tear.

4. Why is electronic fuel injector cleaner used as an additive in petrol?

To clean deposits from the injectors to improve vehicle performance and fuel economy.

ELEMENT TWO
Demonstrate knowledge of petrol combustion processes.

1. What is meant by the term stoichiometric ratio?

The air fuel mixture ratio that gives the chemically correct (ideal) combination of air and fuel is called the stoichiometric ratio.

2. What is a lean air fuel mixture and how does it affect vehicle performance?

An air fuel mixture that has more air than the ideal stoichiometric ratio. It will increase fuel economy but will decrease engine power if too lean.

3. What is a rich air fuel mixture and how does it affect vehicle performance?

An air fuel mixture that has more fuel than the ideal stoichiometric ratio. It will increase engine power but will decrease fuel economy. However, if too rich engine power will decrease, exhaust emissions will rise and spark plugs will be fouled.

4. Describe what should happen in the combustion chamber during normal combustion.

The air fuel mixture is ignited by the spark plug and burns evenly across the top of the piston.

5. Describe the effects of each of the following on engine performance.

Detonation

Increased heat and pressure will cause the fuel mixture to combust by itself. Can lead to damaged pistons and premature engine wear.

Spark knock

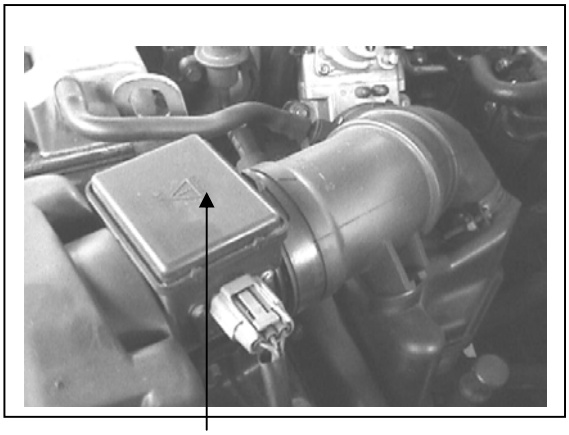
Incorrect ignition timing can cause the spark plug to fire too soon in relation to the correct piston position. This condition will lead to engine damage, may even break the piston.

Dieseling

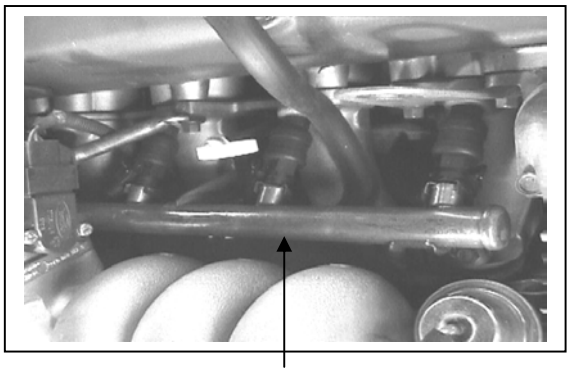
An overheated engine may cause the air fuel mixture to ignite without the use of voltage at the spark plug. Can lead to damaged pistons and premature engine wear.

ELEMENT THREE
Demonstrate knowledge of an electronic fuel injection (EFI) system.

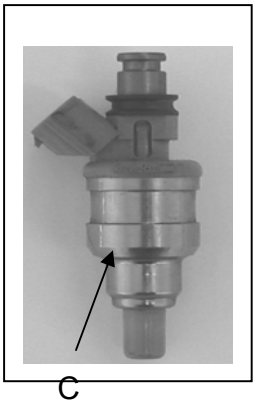
1. Identify the components labelled A-G in the following photographs.



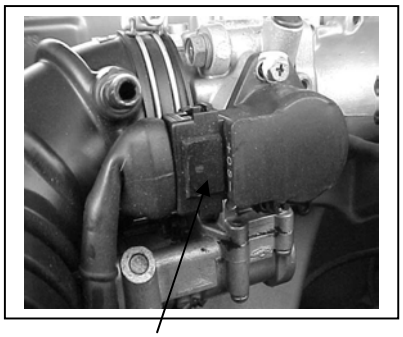
A



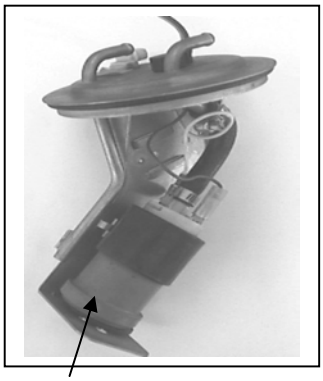
B



C

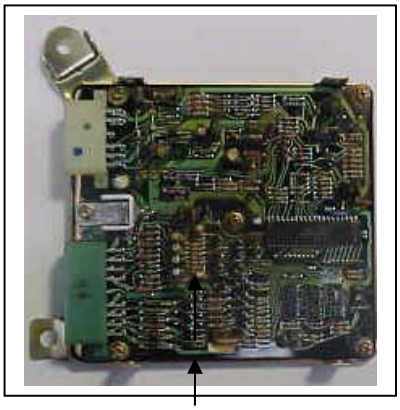


D



E

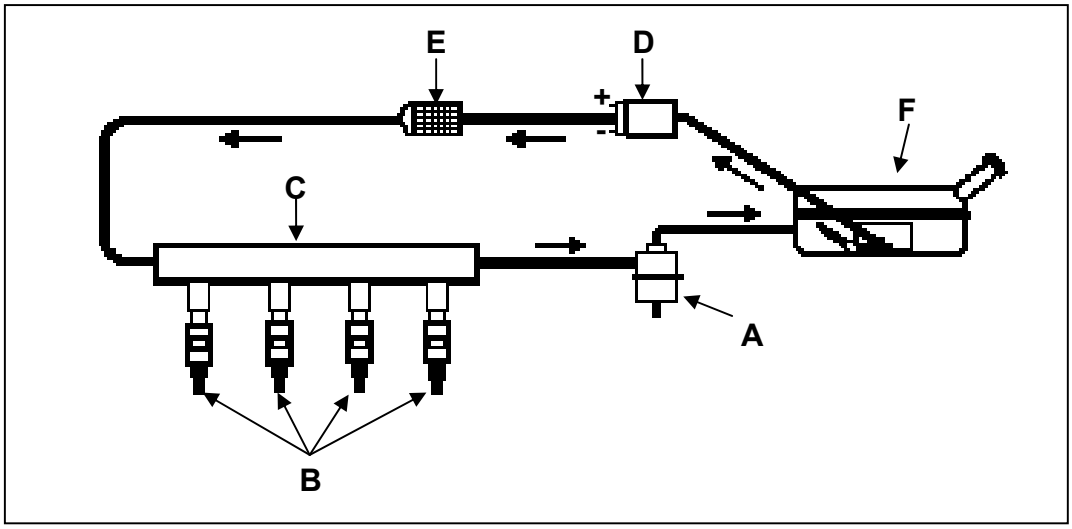
F



G

A	Electronic air flow meter
B	Fuel injector rail
C	Fuel injector
D	Throttle position sensor
E	Electronic fuel pump
F	Temperature sender unit
G	Electronic control unit (ECU)

2. Identify the components labelled A-F in the following diagram.



A	Fuel pressure regulator	**B**	Injectors
C	Fuel rail	**D**	Fuel pump
E	Fuel filter	**F**	Fuel tank

3. Match up the EFI fuel components with the most likely location and function.

A	Air flow meter	**A4**	1	Mounted on the throttle body to detect throttle opening.
B	ECU	**B3**	2	Used by the ECU to determine air pressure in the inlet manifold
C	Engine temperature sensor	**C5**	3	Usually mounted inside the vehicle under the kick panel and receives and interprets information from sensors to deliver the appropriate amount of fuel for the engine operating conditions.
D	Throttle position sensor	**D1**	4	Mounted in the intake ducting and measures intake air volume.
E	MAP sensor	**E2**	5	Mounted on the hottest point of the engine to measure heat

4. Describe the function of each of the following fuel tank components:

Expansion chamber

Prevents fuel tank from being completely filled as a result of heated fuel.

Anti blow back valve

Prevents fuel tank overfill when refilling.

Pick up tube

Allows fuel to be drawn out of the fuel tank.

Pressure/vacuum valve

Allows air to enter the tank and pressure to release

Filter

Stops dirt from entering the fuel tank.

Filler cap

Prevents the escape of fuel and fuel vapours

5. Explain how fuel is supplied into an EFI system

Fuel is supplied into the EFI system by an electric fuel pump. The pump is typically located in or near the fuel tank. It supplies fuel at a high pressure to the fuel rail where the pressure is regulated to about 3 bar.

6. Explain how fuel is metered and delivered into the engine

The fuel is delivered into the inlet manifold or combustion chamber (direct injection) by an electronically controlled injector which is attached to the fuel rail. The volume of fuel being injected is controlled by the ECU which controls the time each injector is open based on input sensor signals.

7. What safety precautions should be followed when working with pressurised fuel lines?

Always depressurise the fuel line before disconnecting any fuel line component.
When disconnecting fuel lines ensure that no fuel sprays onto hot engine parts.

8. What safety precautions should be followed to prevent petrol-rich fumes entering the catalytic converter?

Do not run an engine that is misfiring as the rich mixture within the catalytic can ignite causing damage to the converter.
When carrying out a compression test disconnect the fuel pump.