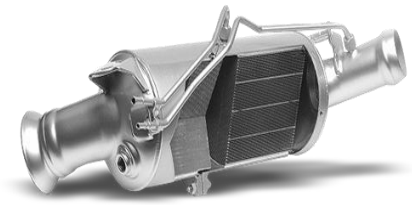
4292-21-022/522 - Level 2 Technical Certificate in Automotive

June 2018

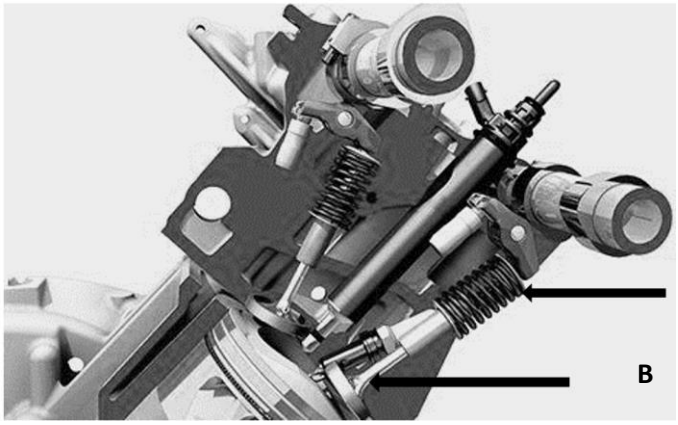
1	State **two** consumables that would require safe storage and handling in the workplace.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following: • Paint • petrol • solvents • brake cleaner • thinners • Battery acid • Oils / coolants • And any other suitable answer		2
2	State **two** safety procedures to help prevent personal injury in the workplace.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following: ▪ Protective equipment for skin/eyes and hands ▪ Preventing hair / clothing being caught ▪ Using safety guards ▪ Spillages ▪ Tidy work area ▪ Supervision And any other acceptable answer		2
3	Explain the benefits of operating as a franchised garage.		
	Acceptable answer(s)	**Guidance**	**Max mks**

	A main dealer has the manufacturer support (1 mark) their technicians are manufacturer trained (1 mark) and have the equipment required to repair and service their particular make of vehicle (known brand) (1 mark). They have access to the latest technical information (1 mark).		4
4a	Explain how to assess the condition of an inertia reel seat belt.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Pull out the webbing to the end of its travel (1 mark), check for damage (cuts/ rips/ tears)(1mark), check condition of its security (1 mark). It retracts automatically (1 mark). Accept to lock when pulled (1mark)		2
4b	State **two** different fluids that **must** be disposed of in line with government regulations following a service.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following: • Oils – engine/gearbox/power steering • Coolant • Brake fluid		2
5a	Identify the component in Figure 1.  http://www.qwiklube.co.uk **Figure 1**		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Diesel particulate filter (DPF).		1

5b	State where the component in Figure 1 is fitted on a vehicle.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Exhaust system		1
5c	Name **two** checks that **must** be carried out after fitting the component in Figure 1 to a vehicle.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for each of any of the following checks: • Leak • Alignment • Correct operation. Securley fitted		2
6a	Explain the principle of a hydraulic split braking system.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	To maintain controlled braking (1 mark), to brake in a straight line should one system fail (1 mark)		2
6b	State the **main** purpose of a brake master cylinder.		
	Acceptable answer(s)	**Guidance**	**Max mks**

	To increase driver effort (1 mark) to hydraulic /pneumatic pressure to operate braking system (1 mark).		2
7a	Compare the advantages and disadvantages between a single track rod and a divided track rod recirculating ball steering system.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Single track rod allows for accurate steering control (1 mark) but small bumps in roads pull both sides of steering/affects toe in or toe out (1 mark). Divided track rod - only the side with the bumps moves / maintains steering geometry (1 mark) but requires more maintenance (1 mark)		4
7b	State why a caster angle is required on a vehicle steering system.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	To provide directional stability (1 mark) and for self-centring steering (1 mark).		2
8a	State **three** reasons why a suspension system is required in a vehicle.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following: • Support weight-sprung/unsprung • To locate axles • Transmit drive and braking torques • To keep tyre contact with the road • To assist passenger comfort.		3
8b	Explain why different materials are used in the construction of suspension system components.		

	Acceptable answer(s)	Guidance	Max mks
	To support the load bearing structure (1 mark) and to allow for movement of the wheels (1 mark), for lightness to increase fuel economy and performance (1 mark), for strength to withstand cornering forces (1 mark).		3
9a	Give **two** reasons why engines are fitted in different positions.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following: • effects vehicle design • effects on engine design • effects on traction • effect on road holding and handling.		2
9b	Summarise the reasons for using a hybrid engine.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Engine does not run constantly (1 mark) so reduces emissions (1 mark) increases fuel economy (more efficient) (1 mark) increased engine life (1 mark) reduced noise (1 mark) Two forms of power (1 mark) Uses energy from braking (1 mark).		3
9ci	Explain the terms 'inlet valve lead, inlet valve lag and valve overlap' in relation to engine valve timing.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Inlet valve lead = the period the inlet valve is open before TDC (1 mark) Valve overlap = the period both valves are open as he piston moves through TD, end of exhaust beginning of induction (1 mark) Inlet valve lag = the period the inlet valve remains open after BDC (1 mark)		3
9cii	Identify the **two** components arrowed in Figure 2.		



Source: http://www.openpr.com/news/430172/

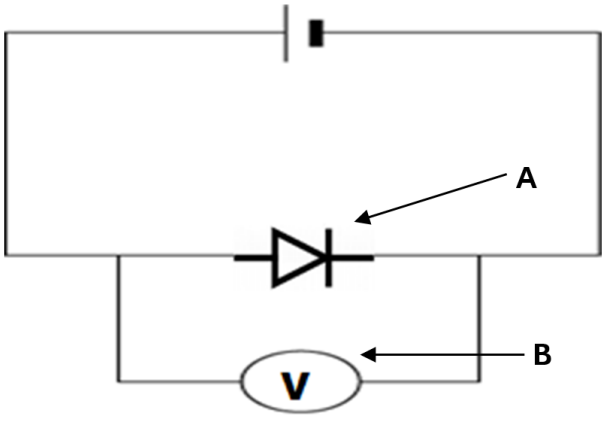
Figure 2

	Acceptable answer(s)	**Guidance**	**Max mks**
	valves and valve springs		2

9d Name **one** statutory requirement in the design of engines.

Acceptable answer(s)	**Guidance**	**Max mks**
1 mark for each of the following: • Noise • Emissions • Power to weight	accept any other plausible answer	1

10ai Identify the type of electrical circuit layout in Figure 3.



http://www.bbc.co.uk/bitesize/quiz/q74171589

Figure 3

	Acceptable answer(s)	Guidance	Max mks
	Series circuit.		1
10aii	Identify the **two** electrical symbols arrowed A and B in Figure 3.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	A – diode B – Voltmeter /Voltage		2
10aiii	State what is being measured at symbol V.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Voltage		1
10b	Explain what symptoms a high resistance will have on a starter motor and its circuit.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	A high resistance will stop the motor from turning at its correct speed (1 mark) it will cause the cables/wires/ terminals to become hot (1 mark)		2
11a	Explain how to use the equipment in Figure 4 to remove a transmission from a vehicle on a ramp.		

https://www.amazon.com

Figure 4

	Acceptable answer(s)	**Guidance**	**Max mks**
	Ensure the jack is on level solid ground (1 mark) and within its safe working load (1 mark) using the pedal lift the cradle to support the transmission (1 mark) secure transmission using the chains and then lower (1 mark).		3

11b	State **two** reasons why a gearbox is used in a vehicle.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark each for any of the following reasons: ▪ To provide a smooth take up of drive. ▪ To allow for permanent or breaks in drive. ▪ To provide an increase in torque. ▪ To allow a range of vehicle speeds. ▪ To transmit drive through the gears.		2

11c	State **two** symptoms of a clutch failing in a vehicle.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Any of the following symptoms: ▪ Unable to select gears (drag) ▪ lack of drive (slip) Judder	Accept any other suitable answer.	2

12	A vehicle has been bought into the workshop after smoke was coming from the bonnet. Upon investigation, it is apparent that there has been an electrical short on the charging circuit which has caused excessive damage to the wiring and alternator. Propose a procedure for carrying out the checks; include health and safety considerations, repairs and testing of the charging circuit.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	<u>Band Descriptors</u> **<u>9-7 marks</u>** The learner gave a detailed explanation on how to disconnect and reconnect the battery, remove and replace the alternator correctly. They have described how to repair and/or replace the wiring/loom as well as given a detailed explanation of how to take voltage and current readings. The learners correctly detailed the procedure to check the battery warning light is operating correctly and checked that all vehicle systems are operating correctly. Health and safety and legal requirements have been considered throughout their answer. The learner has a good depth of understanding of the task and has demonstrated their knowledge in a holistic approach **<u>6-4 marks</u>** The learner gave a brief explanation on how to disconnect and reconnect the battery, remove and replace the alternator without full consideration to safety. They attempted to describe how to repair and/or replace the wiring/loom but there are some inaccuracies. Has given incorrect explanation of how to take voltage and current readings. The learners incorrectly describes the procedure to check the battery warning light is operating correctly and failed to check that all vehicle systems are operating correctly. The learner has a limited level of understanding of the task. **<u>3-1 marks</u>** Learner shows very limited knowledge of the procedure of disconnecting and reconnecting the battery – no mention of safety precautions.	**<u>Indicative Content</u>** The learner must produce a procedure taking the following into consideration: ▪ Health and safety ▪ Removal and replace of alternator ▪ How to take electrical readings (voltage and current outputs). ▪ System testing	9

	The learner has identified some of the process and one or two key areas, but has not been able to describe them in a logical sequence; their approach to the task is very random. No mention of carrying out system checks.		