

4292-530 - Level 3 Advanced Technical Certificate in the Automotive Industry

4292 - 530 Level 3 Automotive Industry – Theory Exam (1)

March 2018

| Q | Acceptable answer(s) | Guidance | Max mks |
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| 1a | 1 mark each for any two of the following: <ul style="list-style-type: none"> ▪ Aluminium alloys. ▪ Copper alloys. ▪ Gold. ▪ Titanium. ▪ Zinc. | | 2 |
| 1b | 1 mark each for any two of the following: <ul style="list-style-type: none"> ▪ Engine blocks. ▪ Cylinder heads. ▪ Pistons. ▪ Bearings. | | 2 |
| 2a | Non-ferrous metals are low in weight (1 mark), have high conductivity (1 mark), resistance to corrosion (1 mark), none magnetic (1 mark). | | 4 |
| 2b | To use heat treatment to strengthen metals (2 marks) | 2 marks for the full definition (no marks for mentioning just 'heat treatment' or 'strengthen metals') | 2 |
| 2c | i) 1 mark each for any of the following: <ul style="list-style-type: none"> • air filters • wiring clips • any other acceptable answer ii) 1 mark each for any of the following: <ul style="list-style-type: none"> • Anaerobic. • Cyanoacrylate. • Epoxy. • Plastisol. • Polyurethane. • Rubber solvent. | | 2 2 |
| 3a | i) Meets regulations (MOT) (1 mark) all components in a roadworthy condition (1 mark). ii) To maintain the manufacturers' warranty (1 mark), to keep the vehicle efficient to maximise fuel economy and reliability (1 mark). | | 2 2 |

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| 3b | Remove wheels and visually check discs and calipers for corrosion/damage/leaks (1 mark), remove pads check wear and condition of lining (1 mark) check brake disc for thickness (1 mark) and run out (1mark). | | 4 |
| 3c | 1 mark for each of the following: <ul style="list-style-type: none"> • Health and safety at work act, • COSHH, • Abrasive wheels regulations • Safe working loads • Any other acceptable answer | | 2 |
| 4 | 1 mark each for any of the following: <ul style="list-style-type: none"> ▪ Inspection manuals (paper or online) ▪ Manufacturer data (paper or electronic) ▪ Handbook | | 2 |
| 5 | So that all the components and systems conform to manufacturers' specification (1 mark) and the vehicles warranty is maintained (1 mark) | | 2 |
| 6 | A beam axle is a solid axle which connects a set of wheels laterally (1 mark) it allows the wheels to move together with the suspension movement of the vehicle (1 mark) | | 2 |
| 7a | When working around live components be careful as electricity can cause burns (1 mark) and electrical shock (1 mark) Be aware of injury from electrical arcing (1 mark) and the possibility of fire (1 mark). | | 4 |
| 7b | Lead (1 mark), lag (1 mark) and overlap (1 mark) | | 3 |
| 7c | i) 1 = ignition coil (1 mark) 2 = HT lead/plug cap (1 mark) ii) Battery voltage flows to the low tension side of the ignition coil (1 mark) when the low tension circuit is switched on voltage flows to earth (1 mark), when the circuit becomes opened (1 mark), this induces a voltage into the secondary winding (1 mark) which causes a high voltage spark at the plug (1 mark). | For electronic ignition substitute points for module, as long as the process is explained. | 2 4 |
| 8a | Wet or multi-plate clutch | | 1 |
| 8b | Friction plates | | 1 |
| 9a | It is a source of energy measured in volts (1 mark), that can cause a current to flow (1 mark), in an electrical circuit or component (1 mark). | | 3 |

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| 9b | i) One mark for each of the following: <ul style="list-style-type: none"> • Voltage (1 mark) • Time (1 mark) • Resistance (1 mark) • Current (1 mark) | | 2 |
| | ii) The multimeter is set to Ohms (1 mark), the leads are placed in the correct sockets, the leads are touched together to calibrate the meter (1 mark), the ignition must be off and the multiplug is removed from the sensor (1 mark), the probes are placed on each of the terminals of the sensor and the reading checked on the scale against manufacturers data (1 mark). | | 4 |
| 9c | i) A diode | | 1 |
| | ii) To allow current to flow in one direction (2 marks) | No marks if just mentioned current and not the direction. | 2 |
| 10a | To cancel out electromagnetic interference (1 mark) | | 1 |
| 10b | i) Numerical coding is just numbers (1 mark), Alpha numerical uses letters and numbers (1 mark). | | 2 |
| | ii) It receives the instructions(inputs) from the sensor (1 mark) then determines the required outputs (1 mark) to control the engines functions in a logical sequence (1 mark) | | 3 |
| 10c | 1 mark for each of the following reasons. As it reduces weight and/or cost. it allows the fast transfer of data. It allows for the ease of installation of accessories. | | 2 |
| 11 | 1 mark for each of the following reasons: <ul style="list-style-type: none"> • more fuel efficient • built stronger/more robust • lower revving • lasts longer • accept any other acceptable answer | | 3 |
| 12 | Bands 9-12 marks The learner has produced a detailed analysis of comparisons between the types of power units. Clearly identifying the differences and the effects these have on the performance of the engine. | Indicative content The learner must consider the design features of the two different engines. They should provide an analysis on the differences in: | 12 |

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| | <p>They recognise that the power of a 2 stroke engine occurs at a higher rpm with a narrow power band but a 4 stroke has a wider spread of torque at a lower engine speed.</p> <p>They have explained in full detail, the differences in the operating principles of the two engine types and explored the reasons why emission regulations favour 4 stroke over 2 stroke engines.</p> <p>The servicing requirements have been fully detailed including oil mix and consumption and the difference in spark plug wear.</p> <p>The candidate has provided a holistic analysis covering all key areas.</p> <p>5–8 marks</p> <p>The learner has produced a comparison between the types of power units but lacks analytical detail. Clearly identifying some differences and the effects these have on the performance of the engine.</p> <p>They recognise that the 2 stroke engine speed is higher but doesn't demonstrate knowledge on why this occurs. They also acknowledge that there is a difference in torque in a 4 stroke engine but unable to identify how it is different.</p> <p>They have given some explanation of the differences in the operating principles of the two engine types and has attempted to explain the reasons why emission regulations are different between 4 stroke and 2 stroke engines but unable to justify the reasons.</p> <p>They recognise the need for different servicing requirements but are unaware of the reasons why.</p> <p>The candidate has provided a basic analysis covering some key areas but lacks detail in justifications.</p> <p>4-1 marks</p> <p>The learner has shown limited understanding of the differences between the two engines and does not provide any depth of knowledge regarding operating principles. They fail to mention the different needs on servicing requirements and emissions regulations.</p> <p>Their analysis is brief and disjointed in structure.</p> <p>0 marks – no rewardable material</p> | <ul style="list-style-type: none"> • Materials and their suitability • Operating principles of the 2 engine types • Emission regulations • Servicing requirements | |
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