

4292-20 Level 2 Technical Certificate in Vehicle Technology

4292-520 Level 2 Vehicle Technology - Theory exam (1)

March 2022 Mark Scheme

| Q no. | Acceptable answer(s) | Guidance | Max mks | Ref |
|-----------|---|--------------------------------------|----------|----------------------|
| 1a | i) Kilogram (1). ii) Newton (1). | Accept Kg. Do not accept 'N'. | 2 | 220 01 1.1 AO1 |
| 1b | i) There is reduced tread (1), providing less friction/traction (1). ii) Friction is needed to provide grip to allow the clutch to provide drive (1). This will transmit torque to the drive train (1). | | 4 | 220 01 1.2 AO2 |
| 2a | Because they are light weight (1); decreasing fuel economy (1). Or At the end of life they can be recycled (1); reducing the effects on land fill (1). Or They are easily formed (1), allowing different shapes/designs to be utilised (1). | | 2 | 220 01 1.3 AO2 |
| 2b | Vapour locks are produced (1), which would contaminate the fluid (1), causing the brake pedal to become/feel soft/fade (1). | | 3 | 220 01 1.4 AO2 |

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|-------|---|-------------------------------------|---------|-----------------------|
| 3a | <ul style="list-style-type: none"> Current/Amps/Amperage (1) Voltage/Volts (1). | Do not accept A or V. | 2 | 220 02 2.1 AO1 |
| 3b | <p>The current is directly proportional to the voltage (1). This means that increasing the voltage will cause the current to increase (1).</p> <p>Or</p> <p>The current is directly proportional to the voltage (1). This means that decreasing the voltage will cause the current to decrease (1).</p> | | 2 | 220 02 2.1 AO2 |
| 4a | <p>1 mark per correct headlamp to a maximum of 3 marks.</p> <ul style="list-style-type: none"> Halogen (1) Xenon/HID (1) LED (1) | Do not accept brand names eg Osram. | 3 | 220 02 2.2 AO1 |
| 4a | $R = \frac{V}{I}$ (1) R=24/6 (1) 4 Ω (1) | Final answer must include units. | 3 | 220 02 2.2. AO2 |
| 5a | i) Longitudinal/front/in line engine (1). ii) Rear wheel drive (1) | | 2 | 221 01 1.2 AO1 |
| 5b | Provides a compact overall drive train (1) due to the overall size (1). Or Improved traction is available (1) as the weight is over the driven wheels (1). Or An increase in passenger space is possible (1) due to the absence of a transmission tunnel (1). | | 2 | 221 01 1.1 AO2 |

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| 6a | i) Solid live axle (1) ii) Independent axle (1) | Accept live axle | 2 | 221 01 1.2 AO1 |
| 6b | i) It has low maintenance requirements (1) due to less moving parts (joints) (1) Or It provides a higher payload (1) as it is more robust (1). ii) It provides improved traction (1) due to its ability to maintain tyre contact with the ground surface (1) Or It offers superior passenger comfort (1) as the wheels are able to move independently to each other (1). | | 4 | 221 01 1.2 AO2 |
| 7 | 1 mark per phase to a maximum of 4 marks. A current passes through the armature (1) creating a magnetic field (1) which reacts with a static magnetic field (1) creating a rotary motion of the armature (1). | | 4 | 221 02 2.1 AO2 |
| 8a | <ul style="list-style-type: none"> Coil spring (1). | Accept suspension spring. | 1 | 221 03 3.1 AO1 |
| 8b | Absorbs road shocks (1) Or Supports the vehicle mass (1) Or Maintains ride height (1). | Do not accept passenger comfort. | 1 | 221 03 3.1 AO1 |

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| 9 | <p>2 marks per reason, to a maximum of 4 marks.</p> <p>Adjusts suspension height (1), which maintains vehicle stability when cornering (1).</p> <p>The ride height can be adjusted to suit the load on the vehicle (1), this allows for even axle weight distribution and additional ground clearance (1).</p> <p>The ability to raise an axle when vehicle is un-laden (1), to save fuel and/or tyre wear (1).</p> | | 4 | 221 03 3.2 AO2 |
| 10a | <ul style="list-style-type: none"> • Vernier caliper/gauge (1). • External micrometer (1). | <p>Do not accept caliper or gauge without Vernier.</p> <p>Do not accept micrometer without reference to external.</p> | 2 | 221 04 4.1 AO1 |
| 10b | <ul style="list-style-type: none"> • Disc (1) Or • Pad (1). | Accept any other reasonable correct answer. | 1 | 221 04 4.2 AO1 |
| 10c | To determine if the measuring tool is reading correctly (1), ensuring readings are accurate (1). | | 2 | 221.04. 4.2 AO2 |
| 10d | Because air will expand when hot (1), which will give a false reading on the gauge (1). | | 2 | 221.04. 4.2 AO2 |

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|-------|--|---|---------|-----|
| 11 | <p>0 marks No awardable material.</p> <p>1-4 marks Candidate has attempted explanation however this will be lacking in detail. Candidates will be unable to identify the differences between the spring types.</p> <p>Limited understanding is demonstrated. They will only focus on one spring type.</p> <p>The response is unstructured and is not supported by sufficient reasoning or justification.</p> <p>5-8 marks Candidate has attempted an explanation with some detail.</p> <p>Candidates will demonstrate some understanding of the two spring types.</p> <p>There is some structure to the response. A recommendation is provided with limited reasoning or justification.</p> <p>9-12 marks The candidates have explained, in detail, the main differences between the springs.</p> <p>Candidates have provided a detailed reasoning as to which spring type is better suited for carrying loads.</p> <p>The response is well structured, logical and supported with good justifiable reasoning.</p> | <p>Indicative content In their explanation, candidates will explore the following:</p> <ul style="list-style-type: none"> • How the springs operate differently. • Characteristics of each of the two spring types. • The impact of the heavy load on the two spring types. • Handling and stability of vehicles and how the springs react. | 12 | AO4 |