


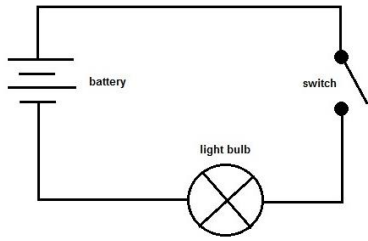
Qualification: 4292-20-020/520 Level 2 Technical Award in Vehicle Technology

June 2018

1a	Describe what is meant by the term 'Coefficient of friction'.		
	Acceptable answer(s)	Guidance	Max mks
	The <i>friction</i> force is the force exerted by a surface (1 mark) when an object moves across it (1 mark) .		2
1bi	Explain the relationship between a clutch and a flywheel during a drive.		
	Acceptable answer(s)	Guidance	Max mks
	Pressure is applied via a cover plate (1 mark) and the clamping force provides friction (1 mark) .		2
1bii	Explain the effect on clutch efficiency if the flywheel surface was contaminated with oil.		
	Acceptable answer(s)	Guidance	Max mks
	The friction (1 mark) will be reduced (1 mark) .		2
2a	Explain why ferrous materials are used in vehicle body panel construction.		
	Acceptable answer(s)	Guidance	Max mks

	Ferrous materials are used for their strength (1 mark) , ability to be formed (1 mark) , low in cost to produce (1 mark) and easily joined (1 mark) .		3
2b	Explain why vehicle brake fluid must be changed regularly.		
	Acceptable answer(s)	Guidance	Max mks
	As it is hygroscopic (1 mark) and will absorb moisture (1 mark) over a period of time thus reducing its boiling point (1 mark) .	Answer must include reduced boiling point and either of the other two answers.	2
3ai	Identify the test equipment in Figure 1.		
	 <p>https://www.shutterstock.com/image-photo/auto-mechanic-uses</p> <p>Figure 1</p>		
	Acceptable answer(s)	Guidance	Max mks
	Voltmeter/multimeter		1
3aii	State what electrical unit is being used		
	Acceptable answer(s)	Guidance	Max mks
	Voltage		1

3b Figure 2 shows an electrical unit. The voltage supplied is 12 Volts and the lamp consumes 9 Watts.



https://www.teachengineering.org/lessons/view/cub_electricity_lesson05

Figure 2

Acceptable answer(s)

Guidance

Max mks

$I = 9/12$ **(1 mark)**
 $I = 0.75$ Amps(units optional) **(1 mark)**

2

4a State three purposes of a battery.

Acceptable answer(s)

Guidance

Max mks

Provides power to start the vehicle (CCA) **(1 mark)**
 Acts as a storage supply (Ah) **(1 mark)**
 Distributes electrical power around the vehicle **(1 mark)**
 And any other sensible answer.

3

4b Explain the advantages of fitting Light Emitting Diode (LED) headlamps to vehicles.

Acceptable answer(s)

Guidance

Max mks

Any **three** of the following advantages.

- Improves the vehicle's appearance
- Longer operating life
- Resistant to shock and vibration
- Energy saving
- Environmentally friendly
- Faster response time
- Improved road safety.


3

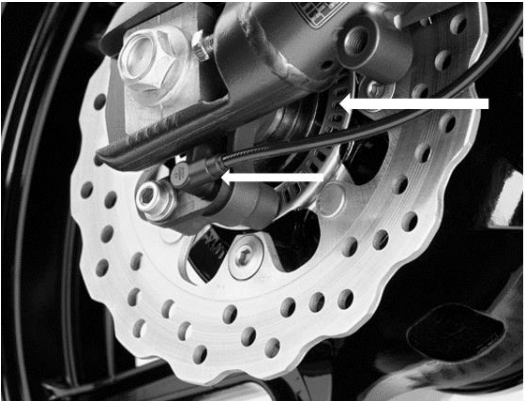
5a State two reasons why four stroke compression ignition engines are used in heavy goods vehicle engines


Acceptable answer(s)

Guidance

Max mks

	Provides high torque characteristics (1 mark) and is economical on fuel (1 mark) . And any other suitable answer.		2
5b	Explain the reasons for using a vee configuration engine in a motorcycle.		
	Acceptable answer(s)	Guidance	Max mks
	Compact design reduces frontal cross section area (1 mark) Improves handling due to narrow width (1 mark) And any other suitable answer.		2
6a	Identify the type of rear axle arrangement shown in Figure 3.		
	 <p>http://jonesandblount.com/category/uncategorized/</p> <p>Figure 3</p>		
	Acceptable answer(s)	Guidance	Max mks
	Twin/two rear axle. (1 mark)		1
6b	State the type of vehicle the axle arrangement in Figure 3 is fitted to.		
	Acceptable answer(s)	Guidance	Max mks

	Heavy goods vehicle. (1 mark)		1
6c	Explain why multiple axles are used on this type of vehicle.		
	Acceptable answer(s)	Guidance	Max mks
	Any of the following reasons: <ul style="list-style-type: none"> • Provides increased traction • Equalises the load • Maintains stability in the event of a tyre failure • Provides greater weight carry capability • Increases tyre life 		4
7	Explain the operating principle of an electric motor.		
	Acceptable answer(s)	Guidance	Max mks
	Voltage is supplied to the windings (1 mark) this creates a magnetic field (1 mark) which causes a reaction (1 mark) which then allows rotation of the armature (1 mark) .		4
8a	Identify the two components arrowed A and B in Figure 4.		
	 <p>Source: https://www.kawasaki-cp.khi.co.jp/technology/chassis/tech</p> <p>Figure 4</p>		
	Acceptable answer(s)	Guidance	Max mks

	ABS sensor (1 mark) and reluctor wheel (1 mark) .		2
8bi	Explain the purpose of the following heavy goods vehicle braking system components. Air compressor.		
	Acceptable answer(s)	Guidance	Max mks
	supplies air pressure (1 mark) to the reservoir tanks (1 mark)		2
8bii	Explain the purpose of the following heavy goods vehicle braking system components. Brake actuator.		
	Acceptable answer(s)	Guidance	Max mks
	converts air pressure (1 mark) into mechanical effort (1 mark)		2
9a	Identify the tool in Figure 5 and give two examples of its use.		
	 <p>https://www.powertoolwarehouse.co.uk/</p> <p>Figure 5</p>		
	Acceptable answer(s)	Guidance	Max mks
	A Dial Test Indicator (DTI) (1 mark) used for measuring brake disc (1 mark) or flywheel run-out (1 mark) . (Any other appropriate answers accepted)		3
9b	Explain how to measure brake disc run-out.		

	Acceptable answer(s)	Guidance	Max mks
	Using a DTI gauge (1 mark) ensure the dial is set to zero. (1 mark) Rotate the disc at least 1 full rotation (360degrees) (1 mark) and record the readings. (1 mark)		4
10	A customer is considering purchasing a light vehicle and is unsure whether to choose a compression ignition (CI) or spark ignition (SI) power unit. Produce a report on the key features of each power unit type. In your report, include comparisons of compression ratios for both types and justify your recommendations.		
	Acceptable answer(s)	Guidance	Max mks
	<p>Band descriptors</p> <p>9-12 marks They have identified the difference in the two engine types. Detailed explanation made of the considerations listed. They have recommended a suitable power unit for a light vehicle and has provided clear rationale for their reasons. The response is well structured and supported with justifiable reasoning.</p> <p>5-8 marks They have identified some key difference in the two engine types. Provides a brief explanation of the considerations listed. They have recommended a suitable power unit for a light vehicle but has provided limited rationale for their reasons. The response is structured with some reasoning supported by sufficient reasoning or justification.</p> <p>1-4 marks The learner shows a limited knowledge of the task or how to approach it. They have identified one power unit without comparison to another. No mention made of considerations listed. They have provided limited detail of only one or two key areas but unable to link them together. The response is unstructured and is not supported by sufficient reasoning or justification.</p> <p>0 marks No rewardable material.</p>	<p><u>Indicative content</u></p> <p>Learners are asked to produce a report for selecting appropriate power units. In their report, they are to consider the following:</p> <ul style="list-style-type: none"> ▪ Compression ratios ▪ Weight ▪ Power torque ▪ Emission ▪ Maintenance ▪ Life span 	12