

Level 3 End-point Assessment for Heavy Vehicle Service and Maintenance Technician

(9302-303/304)

December 2024, v1.0

Knowledge tests

Sample papers, answer sheets and mark schemes

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Introduction



What is in this document

This document contains the Sample Knowledge tests for the Level 3 Heavy Vehicle Service and Maintenance Technician Apprenticeship:

- Knowledge Test Engineering (303)
- Knowledge Test Wider standard (304)

How to use the forms

The following documents are included for each test:

- Sample questions
- Answer sheet
- Mark scheme

Apprentices should be provided with the sample questions and the answer sheet for the relevant test.

The mark scheme is to be used by employers/training providers/tutors to mark the completed tests.

9302-303 Knowledge Test Engineering

You should have the following for this test

- a pen with black or blue ink
- answer sheet

Read the following notes before you answer any questions:

- Attempt all questions
- If you find a question difficult, leave it and return to it later

This paper contains 35 questions.

Section A contains 5 questions worth two marks each.

Section B contains 30 questions worth one mark each.

This question paper is the property of City & Guilds

How to complete the answer sheet

For typical multiple choice questions:

Each question shows four possible answers (lettered 'a', 'b', 'c' and 'd'); only one is correct.

Decide which one is correct and mark your answer on the answer sheet with your pen.

For example if you decide 'b' is correct, mark your answer with a cross like this:



If you change your answer, cancel your first choice by filling in the box then put a cross in the answer which you have now decided is correct like this:



For alternative type questions:

Questions 10, 13, 16, 20: Write the statements in the correct order in the relevant box in the answer sheet.

Questions 28, 29, 31, 32: Match the labels to the correct corresponding number in the answer sheet.

Questions 14, 27: Fill in the grid in the answer sheet in the order of the images, e.g.



Right	Up
Down	Left

9302-303 Knowledge Test Engineering -Sample questions



- 01. When working on an air braking system drum brake, what safety issue should a technician be aware of?
 - a. Air pressure is present in the system.
 - b. The pad backing has become corroded.
 - c. Fluid may have contaminated the linings.
 - d. The master cylinder seals could fail.
- 02. What is a possible risk when working on an air suspension system with a perished air bag?
 - a. The compressor can cut in at any time.
 - b. The ride height will require calibrating.
 - c. The suspension could rapidly deflate.
 - d. The suzie lines could uncouple.
- 03. What danger is present when recharging lead acid batteries?
 - a. The battery connections can become loose causing an open circuit.
 - b. The battery cells can short out internally causing a fire risk.
 - c. The battery electrolyte can distil creating weak solution.
 - d. The battery can give off hydrogen gas which is explosive.
- 04. A hybrid vehicle has been brought into the workshop with the hybrid system inoperative. Why is it important to allow the high voltage capacitors time to discharge before working on the vehicle?
 - a. The transistors need to reset to reduce voltage to the system.
 - b. The ignition system requires powering down to minimise voltage.
 - c. The traction motor needs to allow a predetermined voltage leakage.
 - d. The electrical stored energy needs time to dissipate to a safe voltage.
- 05. Which fuel pressure range is required in a common rail diesel engine for the correct operation of the system?
 - a. 20 to 25 Bar
 - b. 100 to 200 Bar
 - c. 2000 to 2500 Bar
 - d. 10000 to 20000 Bar
- 06. Why are monocoque body shells used in vehicle design?
 - a. To reduce overall weight.
 - b. To increase occupant capacity.
 - c. To improve corrosion protection.
 - d. To prevent vehicle rollover.

07. Why are ladder frame chassis popular in the manufacture of heavy vehicles?

- a. They are flexible and improve overall road holding.
- b. They can withstand excessive corrosion and rusting.
- c. They are light in weight and reduce fuel consumption.
- d. They are strong in construction and can carry heavy loads.

08. Why are draw bars fitted to rigid heavy vehicles?

- a. To allow for maximum suspension height.
- b. To reduce total load length overhang.
- c. To decrease the overall turning circle.
- d. To increase the total braking distance.

09. What is meant by the term 'wheel offset' on a road wheel?

- a. The distance from the top of the wheel to the lower arch.
- b. The distance from the wheel upper edge to the road surface.
- c. The distance from the hub mounting surface to the wheel centreline.
- d. The distance from the lower suspension arm to the inner wheel rim.

10. Place the statements in the correct order, when carrying out a dynamic wheel balance after the replacement of a tyre.

Ensure the tyre is centralised on the machine

Check all old weights have been removed

Add weights as required until balanced

Start machine and check reading

- 11. What is the minimum legal tread depth of a tyre fitted to a heavy vehicle that weighs over 3,500 kilograms?
 - a. 0.6mm
 - b. 1.0mm
 - c. 1.6mm
 - d. 2.0mm

12. What steering system is shown in the image?



- a. Single driven axle.
- b. Passive driven axles.
- c. Active steered axle.
- d. Multi steered axles.
- 13. Place the statements in the correct sequence to carry out a pressure check on a hydraulic power steering system.

Check for leaks and turn the steering from lock to lock

Check pressure reading against specification

Check vehicle is in neutral and start the engine

Connect pressure gauge to pump outlet

14. Match the labels of the symptoms of suspension faults on to the correct image.

Vehicle leaning to one side

Clunking noise when taking sharp turns

Vehicle suspension drops when parked overnight

Vehicle ride height not adjusting







- 15. Which ABS system is used on articulated heavy goods vehicles?
 - a. Full air pressure.
 - b. Electronic over hydraulic.
 - c. Hydraulic with air.
 - d. Total electric operation.
- 16. Place the statements in the correct sequence for the operation of an electronic braking system.

Operates the solenoids in the modulator valve

Actuates the calipers to prevent the wheel from locking

ECU detects change in wheels speeds from the sensors

Holds or maintains or releases pressure, dependent on wheel speed

- 17. Why is it important that wheel nuts are torqued to the manufacturer's specifications?
 - a. To reduce the amount of thread from being damaged.
 - b. To stop the wheel studs from being over stretched.
 - c. To prevent damage to the wheel locking ring.
 - d. To allow for slight movement between the hub and wheel.

- 18. What is a reason for using a direct injection system in a diesel engine?
 - a. To burn the fuel more efficiently to reduce emissions.
 - b. To reduce carbon build up on the inlet valves.
 - c. To make the pistons lighter to save weight.
 - d. To enable a catalytic reduction system to be fitted.
- 19. Why do manufacturers install exhaust gas recirculation systems to heavy vehicles?
 - a. To minimise particulate matter.
 - b. To control hydrocarbons.
 - c. To monitor carbon dioxide.
 - d. To reduce nitrogen oxides.
- 20. Place the statements in the correct sequence to carry out an active regeneration on a heavy vehicle.

The hot exhaust gases burn off the soot deposits from the filter

The ECU activates the regeneration system

The ECU identifies a difference in pressure in the DPF

A process takes place to increase exhaust temperature

- 21. Which fault would cause an engine management system to default to a limp home mode?
 - a. No signal from the inductive crankshaft sensor.
 - b. Slight leak from a fuel injector return pipe.
 - c. Lack of data from coolant temperature sensor.
 - d. Reduced air flow from a dirty filter element.
- 22. Why could a turbocharger flexible hose collapse when on boost?
 - a. Reduced flow in intercooler.
 - b. Worn turbine vanes.
 - c. Leaking exhaust manifold.
 - d. Damaged impeller blades.

23. Why is a thermal fuse used in vehicle electrical system?

- a. To protect circuits from a direct short.
- b. To allow circuits to handle more current.
- c. To protect components from damage.
- d. To allow components to be fitted in parallel.
- 24. Why do manufacturers use CAN Bus networking systems on their heavy vehicles?
 - a. To control all input speed of the electronic sensors.
 - b. To allow high speed data transfer between electronic control units.
 - c. To prevent data from being corrupted when downloading information.
 - d. To operate the actuators from one central hard drive.

- 25. Which type of electrical circuit would allow one headlamp to remain illuminated if the other headlamp failed?
 - a. A series circuit.
 - b. A high resistance circuit.
 - c. A diode protected circuit.
 - d. A parallel circuit.
- 26. Why is it important that a CAN Bus system has termination resistors fitted at each end of the network?
 - a. To allow for an increase in data transfer speed if requested by a safety component.
 - b. To maintain good communication across the network by reducing electrical noise.
 - c. To convert all digital signals in to an analogue signal for any auxiliary components.
 - d. To ensure no loss of signal strength across the network by monitoring binary output.
- 27. Match the labels of the cylinder head valve components on to the correct image.

Guide	Seal	Collet	Retainer



28. Match the labels onto the correct components of the lubrication system in the image.

29. Match the labels of the description of the four stroke cycle onto the correct image.

Induction	Compression	Power	Exhaust
1	2	3	4

30. What is the function of the component numbered 6 in the image?



- a. To regulate the clutch hydraulic fluid flow in the supply line.
- b. To maintain the correct clutch bearing free play.
- c. To mix fluid with air for correct clutch control.
- d. To control the amount of air pressure to the clutch cylinder.
- 31. Match the labels onto the correct components of the differential in the image.



32. Match the labels onto the correct components of the differential in the image.



- 33. What should be taken into account when carrying out diagnostic testing at a breakdown on the roadside?
 - a. Location of the on-board OBD socket.
 - b. Cost of any additional labour time.
 - c. Accessibility to engine components.
 - d. Driver's total daily working hours.
- 34. In which state does the air conditioning refrigerant leave the compressor?
 - a. Low pressure cold liquid.
 - b. High pressure hot gas.
 - c. Low pressure cool gas.
 - d. High pressure warm liquid.
- 35. Why is a standard routine recommended when carrying out safety inspections on heavy vehicles?
 - a. To allow for minimum maintenance time.
 - b. To reduce the amount of breakdowns.
 - c. To ensure all items are checked.
 - d. To prevent the failure of components.

9302-303 Knowledge Test Engineering -Answer sheet



Title	Knowledge Test Engineering	Test	9302-303
Apprentice		Date	

01	a	b	С	d	20				
02	a	b	С	d					
03	а	b	С	d					
04	а	b	С	d					
05	а	b	С	d	21	a	b	С	d
06	a	b	С	d	22	a	b	С	d
07	a	b	С	d 🗌	23	a	b	С	d
08	a	b	С	d 🗌	24	a	b	C	d
09	a	b	С	d	25	a	b	С	d
10					26	a	b	С	d
					27				
					28	1.			
11	a	b	С	d		2.			
12	a	b	С	d		3.			
13						4.			
					29	1.			
						2.			
			!			3.			
14						4.			
					30	a	b	С	d
15	а	b	C	d	31	1.			
16						2.			
						3.			
						4.			
					32	1.			
17	a	b	С	d		2.			
18	a	b	С	d		3.			
19	a	b	С	d		4.			

33	a	b	С	d
34	a	b	С	d
35	a	b	С	d 🗌

Score	/40	Grade	
Marked by		Date	

9302-303 Knowledge Test Engineering -Mark Scheme



Grading: Section A pass 6/10 Overall pass: 26/40

Q	Кеу	14	Vehicle ride	Vehicle leaning	
Sect	ion A		height not	to one side	
(Que	estions worth 2 marks each)		adjusting		
01	а		Vehicle	Clunking noise	
02	С		suspension	when taking	
03	d		drops when	sharp turns	
04	d		parked overnight		
05	С	15	а		
Sect	ion B	16	ECU detects chan	ge in wheels	
(Que	stions worth 1 mark each)		speeds from the s	ensors	
06	а		Operates the sole	noids in the	
07	d		modulator valve		
08	С		Holds or maintains	s or releases	
09	С		pressure, dependent on wheel		
10	Check all old weights have been		speed		
	removed		Actuates the calipers to prevent the		
	Ensure the tyre is centralised on the		wheel from locking	9	
	machine 17 b				
	Start machine and check reading	18	а		
	Add weights as required until	19	d		
	balanced	20	The ECU identifies	s a difference in	
11	b		pressure in the DF	PF	
12	d		The ECU activates	s the regeneration	
13	Connect pressure gauge to pump		system		
	outlet		A process takes place to increase		
	Check vehicle is in neutral and start		exhaust temperature		
	the engine		The hot exhaust gases burn off the		
	Check for leaks and turn the		soot deposits from	n the filter	
	steering from lock to lock 21 c				
	Check pressure reading against	22	а		
	specification	23	С		

24	b		
25	d		
26	b		
27	Collet	Guide	
	Retainer	Seal	
28	3 1. Relief valve		
	2. Filter		
	3. Pump		
	4. Strainer		
29	1. Compression		
	2. Exhaust		
	3. Power		
	4. Induction		

30	d
31	1. Planetary gear
	2. Carrier
	3. Thrust washer
	4. Sun gear
32	1. Clutch fork
	2. Selector fork
	3. Helical gear
	4. PTO gear
33	с
34	b
35	С

9302-304 Knowledge Test Wider standard



You should have the following for this test

- a pen with black or blue ink
- answer sheet

Read the following notes before you answer any questions:

- Attempt all questions
- If you find a question difficult, leave it and return to it later

This paper contains 35 questions. All questions have equal marks.

This question paper is the property of City & Guilds

How to complete the answer sheet

For typical multiple choice questions:

Each question shows four possible answers (lettered 'a', 'b', 'c' and 'd'); only one is correct.

Decide which one is correct and mark your answer on the answer sheet with your pen.

For example if you decide 'b' is correct, mark your answer with a cross like this:

1 a b X c d

If you change your answer, cancel your first choice by filling in the box then put a cross in the answer which you have now decided is correct like this:



For alternative type questions:

Question 2: Write the statements in the correct order in the relevant box in the answer sheet. Question 8: Match the labels to the descriptions in the relevant box in the answer sheet. Questions 10, 12, 13, 16: Fill in the grid in the answer sheet in the order of the images, e.g.



9302-304 Knowledge Test Wider standard -Sample Questions



- 01. How can the risk from electric shock be reduced when using power tools?
 - a. By using the correct cable colour.
 - b. By ensuring a residual current device is fitted.
 - c. By continuity checking the internal resistance.
 - d. By increasing the voltage supply.
- 02. Place the statements in the correct sequence to complete a risk assessment.

Identify the likelihood of the

risk

Identify who is at risk

Identify the control measures

Identify the hazard

- 03. When carrying out a vehicle inspection, what test could reduce the risk to pedestrians?
 - a. Operation of the reverse bleepers.
 - b. Function of the indicator warning buzzer.
 - c. Checking the levels of the engine decibels.
 - d. Conformity to legal exhaust noise levels.
- 04. A vehicle has been brought into the workshop. You need to check a noise from the exhaust system, which requires the vehicle to be running. What control method is the **most** effective in reducing the risk of lung damage?
 - a. Open the emergency exit door.
 - b. Ensure all staff wear masks at all times.
 - c. Use an exhaust ventilation extraction system.
 - d. Prohibit running engines for long periods.
- 05. Which of the following is required to compile a risk assessment strategy when dealing with the supply, handling and use of chemicals?
 - a. The safety data sheet.
 - b. The item description.
 - c. The delivery invoice note.
 - d. The pictogram warning symbol.

06. Who is responsible for the production and review of chemical safety data sheets?

- a. The supplier.
- b. The distributor.
- c. The employer.
- d. The manufacturer.

07. Which type of fire extinguisher does not require a pressure gauge to be fitted?

- a. Powder.
- b. Foam.
- $c. \ CO_2.$
- d. Water.
- 08. Match the class of fire type to its correct description.

Class A	Combustible metal fire
Class B	Wood/paper fire
Class C	Electrical fire
Class D	Flammable liquid fire

- 09. An employee has had a work accident. When would it require an entry in the accident book in order to adhere to RIDDOR regulations?
 - a. If they are incapacitated for at least 2 consecutive days.
 - b. If they are incapacitated for at least 3 consecutive days.
 - c. If they are incapacitated for at least 4 consecutive days.
 - d. If they are incapacitated for at least 5 consecutive days.

10. Match the correct descriptions to the signs.



- 11. Who is responsible for the positioning of safety signs in the workplace?
 - a. The employer.
 - b. The local council.
 - c. The trade union.
 - d. The manufacturer.

12. Match the labels to the correct types of signs.



13. Match the labels to the correct hammer type.



14. What is the function of the diagnostic equipment shown in the image?



- a. To check for the correct fuel return.
- b. To check for the correct fuel rating.
- c. To check the correct fuel pump pressure.
- d. To check the correct fuel delivery volume.
- 15. What are the gauges in the image used to measure?



- a. Pneumatic brake working pressure.
- b. Engine oil operating pressure.
- c. Air conditioning high and low pressure.
- d. Injector rail leak off pressure.

16. Match the labels to the correct sheet metal fabrication tool.



17. What does the reading on the multimeter display screen indicate in the image?



- a. A short circuit.
- b. An open circuit.
- c. A closed circuit.
- d. A live circuit.
- 18. What is checked when testing a diode with a multimeter?
 - a. Capacitance rating.
 - b. Power gain factor.
 - c. Internal impedance loss.
 - d. Current flow direction.

- 19. Which multimeter setting would be selected to measure a heavy goods vehicle regulated voltage when fitted with twin batteries connected in series?
 - a. 2 V.
 - b. 20 V.
 - c. 200 V.
 - d. 200 mV.

20. Why is a digital multimeter fitted with an auto ranging function?

- a. So values are self selected.
- b. So values must be selected.
- c. So reading can be stored.
- d. So readings are downloaded.
- 21. Who holds the National Register for all operating centres' transport managers' data?
 - a. Driver and Vehicle Licensing Agency.
 - b. Road Haulage Association.
 - c. Vehicle Operator Service Agency.
 - d. Freight Transport Association.

22. What is the recommended inspection interval for goods vehicles working off road in difficult conditions?

- a. 4-6 weeks.
- b. 6-8 weeks.
- c. 8-10 weeks.
- d. 10-12 weeks.
- 23. Which piece of equipment must staff have access to at all times to comply with the operator licence requirements?
 - a. Fault code reader.
 - b. Headlamp beam setter.
 - c. Exhaust opacity meter.
 - d. Wheel alignment gauges.
- 24. Who should be informed of any changes to the maintenance arrangements of an operating centre's fleet?
 - a. Traffic commissioner.
 - b. Police constabulary.
 - c. Vehicle inspectorate.
 - d. Local council.
- 25. Who is responsible for signing off a vehicle safety inspection sheet?
 - a. Transport manager.
 - b. Workshop technician.
 - c. Designated driver.
 - d. Shift supervisor.

26. Which body has the authority to carry out a roadside inspection?

- a. Driver and Vehicle Licencing Agency.
- b. Freight Transport Association.
- c. Driver and Vehicle Standards Agency.
- d. Road Haulage Association.
- 27. Where would the DVSA obtain information when carrying out an Operator Compliance Risk Score (OCRS)?
 - a. Driver level checks.
 - b. Annual test results.
 - c. Warranty record claims.
 - d. Vehicle recall data.
- 28. A lorry has been issued with an immediate PG9 prohibition order at the roadside and has since been repaired. Who can authorise the lorry's return to roadworthiness?
 - a. Appointed tester.
 - b. Police officer.
 - c. Vehicle examiner.
 - d. Traffic commissioner.
- 29. Why is it important to a garage to meet customers' expectations?
 - a. To complete all workshop tasks quickly.
 - b. To award technicians additional bonuses.
 - c. To ensure a good reputation is gained.
 - d. To adapt to new consumer demands.
- 30. How can the workplace benefit from the employees behaving professionally?
 - a. Productivity is improved.
 - b. Inspection checks can be reduced.
 - c. Additional training is offered.
 - d. An enhanced salary is provided.
- 31. Why is it important to ensure repair invoices are sent out in a timely manner?
 - a. To increase profits.
 - b. To maintain cash flow.
 - c. To provide discounts.
 - d. To issue bonuses.
- 32. What is the **most** effective method of allowing all staff to voice their concerns regarding safety in the workplace?
 - a. Send out a web survey.
 - b. Hold an informal interview.
 - c. Request a formal team meeting.
 - d. Start a social media page.

- 33. What is the **most** effective way to inform workshop staff of the fleet vehicle inspection schedule?
 - a. Using a wall chart planner.
 - b. Sending an email to the driver.
 - c. Noting the registration in a diary.
 - d. Verbally telling the workshop foreman.

34. Which questioning technique should be adopted to obtain **additional** information regarding a driver reporting a vehicle defect?

- a. Open.
- b. Closed.
- c. Leading.
- d. Probing.
- 35. When working on the hard shoulder at night, what safety precaution must be adopted before leaving the vehicle?
 - a. Place cones behind the recovery vehicle.
 - b. Ensure all warning beacons are switched on.
 - c. Move the vehicle to an illuminated area.
 - d. Request the overhead gantry be activated.

9302-304 Knowledge test Wider standard -Answer sheet



Title	Knowledge Test Wider standard	Test	9302-304
Apprentice		Date	

01	a	b	C	d 🗌
02				
03	a	b	С	d
04	a	b	С	d
05	a	b	С	d
06	a	b	С	d
07	a	b	С	d
08	Class A:			
	Class B:			
	Class C:			
	Class D:			
09	a	b	С	d
10				
11	a	b	С	d
12				
13				
14	a	b	C	d
15	a 🔄	b	C	d
16				

17	a	b	С	d 🗌
18	a	b	С	d
19	a	b	С	d
20	a	b	С	d
21	a	b	С	d
22	a	b	С	d
23	a	b	С	d
24	a	b	С	d
25	a	b	С	d
26	a	b	С	d
27	a	b	С	d
28	a	b	С	d
29	a	b	С	d
30	a	b	С	d
31	a	b	С	d
32	a	b	С	d
33	a	b	С	d
34	a	b	С	d
35	a	b	С	d

Score	/40	Grade	
Marked by		Date	

9302-304 Knowledge Test Wider standard - Mark Scheme



Grading: Pass 23 marks (65 %)

01	b			
02	Identify the hazard			
	Identify who is at risk			
	Identify the likelihood of the risk			
	Identify the control measures			
03	а			
04	С			
05	a			
06	d			
07	C			
08	Class A - Wood/paper fire			
	Class B - Flammat	ole liquid fire		
	Class C - Electrica	l fire		
	Class D - Combus	tible metal fire		
09	b			
10	Mandatory	Prohibition		
	Emergency	Warning		
11	а			
12	Pictogram image	Boundary marker		
	Portable sign	Sign board		
13	Copper hide	Dead blow		
10	hammer	hammer		
	Claw hammer	ball-peen hammer		
14	а			
15	С			

16	Bender	Nibbler		
	Roller	Guillotine		
17	b			
18	d			
19	С			
20	а			
21	С			
22	а			
23	b			
24	а			
25	b			
26	С			
27	b			
28	С			
29	С			
30	а			
31	b			
32	С			
33	а			
34	d			
35	b			