Please revise the following text to suit your requirements.

This sample scheme of work covers both classroom and workshop based learning for Unit 310. It is based on 90 hours across 15 sessions plus additional hours for independent learning.

This is only an example of a possible scheme of work. You can use it as it is, adjust it or extract content to suit your delivery needs, or the needs of individual learners.

The schemes of learning are intended to be learner-focused, and embrace current pedagogical methodology such as flipped and blended learning.

A version of this scheme of learning with **full supporting materials** is also available to purchase on **SmartScreen.co.uk**.

Where possible we have included blended learning activities that make good use of technology so as to help centres fulfil the minimum amount of digital teaching recommended by government.

Centres should also provide opportunities within the unit content to introduce the following wider skills and government initiatives:

- English, mathematics and ICT
- employability skills and behaviours
- British values (including the Prevent strategy).

Centres should also incorporate the following themes, where appropriate. Although they are not specifically referred to in the scheme of learning, City & Guilds regards these as essential in the teaching of the qualification:

- spiritual, moral, social and cultural issues
- health and safety considerations, in particular the need to impress upon learners the fact that they must preserve the health and safety of others as well as themselves
- environmental education and related European issues.

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Lesson 1: Vehicle performance data analysis – Part 1 **Suggested teaching time:** 4 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
Topic 1.1 Obtaining and comparing vehicle related data.	Introduce the topic on obtaining and comparing vehicle related data. The learners must have an understanding of why and how engine performance data is recorded including: • engine power and torque for performance • fuel consumption for economy. Discuss with learners why it is important to know accurate information and data about vehicles. Ask the learners to think about why stakeholders might want to manipulate or misrepresent data – link to diesel engine emission scandal. Learners will need to understand the methods by which engine performance data can be collected and be able to compare the data via different formats. *(The learners do not need to measure real engine performance via a dynamometer but simply gather and analyse engine data from a range of sources.)* **Opportunity for applied learning** • Discuss with the group why they feel engine performance data needs to be compared and then ask the learners to obtain relevant engine power and torque data for a minimum of three different vehicles. This data will need to be presented in a report in a subsequent lesson.	Vehicle data websites: www.cars-data.com/en/car-brands-cars-logos.html www.auto-data.net/en/ www.jaguar.co.uk/jaguar-range/xe/pricing-specifications/index.html www.volvotrucks.com/SiteCollectionDocuments/VTC/Market/Trucks/volvo-fmx-2013/pdf/specifications/Volvo%20FMX-Specifications-UK.pdf Diesel engine emissions scandal news story: www.bbc.co.uk/news/business-34324772

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Lesson 2: Vehicle performance data analysis – Part 2

Suggested teaching time: 4 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources

Topic 1.1
 	
Obtaining and comparing vehicle related data.
	Recap lesson 1 relating to vehicle engine related data. Introduce the lesson relating the vehicle speed and braking data.
	
	The learners must have an understanding of why and how vehicle speed and braking data is recorded including;
	
	• acceleration and deceleration for performance
	• brake force and vehicle mass for braking efficiencies.
	
	Discuss with learners why it is important to know accurate information and data about vehicles. Talk about customer information, different vehicle applications and comparison of vehicle data.
	
	Learners will need to understand the methods by which these vehicle performance data can be collected and be able to compare the data via different formats.
	
	(The learners do not need to measure real vehicle speed and braking performance via road testing but simply gather and analyse the data from a range of sources.)
	
	Opportunity for applied learning
	
	• Ask the learners to obtain relevant vehicle speed and braking data for the vehicles identified in lesson 1, and combine with engine performance data to produce a report on:
	  ○ What vehicle characteristics does the data collected represent (heavy load braking capabilities, outright speed etc)?
	  ○ Which vehicle should be chosen for a customer representing each vehicle application?
		www.brake.org.uk/rsw/15-facts-a-resources/facts/1255-speed
		
		www.autoexpress.co.uk/car-reviews/14160/top-stops-braking-test

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Lesson 3: Acceleration, velocity and speed calculations **Suggested teaching time:** 6 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
Topic 1.2 Using mathematical processes.	Introduce the topic of calculating theoretical acceleration, velocity and speed using mathematical formulas. Explain to the learners the difference between velocity and speed, including final velocity and constant speed. Using given formula, learners must be able to calculate acceleration, velocity and speed. **Example acceleration calculation:** When an object moves in a straight line with a constant acceleration you can calculate its acceleration if you know the velocity changes and how long this took. Use the following formula: $$acceleration\ (metre\ per\ second\ squared) = \frac{change\ in\ velocity\ (metre\ per\ second)}{time\ taken\ (second,\ s)}$$ The units for acceleration are commonly written as m/s/s or m/s^2. The equation for acceleration can also be represented as: $a = (v - u) \div t$ where: • *a* is acceleration in m/s/s or m/s^2 • *v* is final velocity in m/s • *u* is initial velocity in m/s • *t* is time in s For example, a car accelerates in 5 s from 25 m/s to 3 5m/s. Its velocity changes by 35 - 25 = 10 m/s. Therefore its acceleration is 10 ÷ 5 = 2 m/s^2	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 3: Acceleration, velocity and speed calculations

Suggested teaching time: 6 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
	Example deceleration calculation: Deceleration, or negative acceleration, is observed when an object slows down. The units are the same as for acceleration but the number has a negative symbol before it. For example, the car slowed down at -1 m/s^2. For example, a car decelerates in 5 s from 35 m/s to 25 m/s. Its velocity changes by 25 - 35 = -10 m/s. Therefore its acceleration is -10 ÷ 5 = -2 m/s^2 or decelerates. **Example average speed calculation:** An object moves in a straight line at a steady speed. Calculate its average speed knowing how far it travelled and how long it took. The following equation shows the relationship between average speed, distance moved and time taken: $average\ speed = \frac{distance\ moved}{time\ taken}$ where: • *average speed* is measured in metres per second, m/s • *distance moved* is measured in metres, m • *time taken* is measured in seconds, s For example, if a car travels 300 m in 20 s. Its average speed is: 300 ÷ 20 = 15 m/s.	

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Lesson 3: Acceleration, velocity and speed calculations

Suggested teaching time: 6 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
	Example velocity calculation: The velocity of an object is its speed in a particular direction. This means that two objects could be travelling at the same speed but have different velocities. For example, two cars are travelling at 30 m/s along the same road but in opposite directions: One of the cars has a velocity of +30 m/s. The other car has a velocity of -30 m/s. The opposite signs show that they are travelling in opposite directions. **Example relative velocity and its calculations:** If two objects are moving in parallel their relative velocity can be calculated as shown: Car A is travelling at +30 m/s and car B is travelling at +20 m/s. Their relative velocity is 30 - 20 = +10 m/s. If the two cars are moving in opposite directions, the velocity of car A is +30 m/s and the velocity of car B is -20 m/s. Their relative velocity is 30 - (-20) = 30 + 20 = +50 m/s. **Opportunity for applied learning** • Using the examples shown, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	

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Lesson 4: Braking efficiency calculations

Suggested teaching time: 4 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
Topic 1.2 Using mathematical processes.	Recap the previous lesson ensuring learners are fully comfortable with completing those calculations. Introduce the lesson relating to braking efficiency calculations with an explanation of why braking efficiency needs to be calculated, for example in vehicle design and braking effectiveness. Using the following formula learners must be able to: **Calculate braking efficiency**: Kinetic Energy = ½ mass x velocity So KE = $^1/_2mv^2$ (where Energy is Joules (J), mass is Kilogrammes (kg) and Velocity is metres/second (m/s) **Calculate stopping distance at a given velocity**: Stopping distance = Kinetic Energy/Retarding Force so SD=$^1/_2mv^2/F$ **Opportunity for applied learning** Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 5: Volume and area of combined shapes calculations

Suggested teaching time: 4 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
Topic 1.2 Using mathematical processes.	Recap the previous lesson ensuring learners are fully comfortable with completing those calculations. Introduce the lesson relating to calculating volumes and areas of combined shapes in order to present results. **Calculate volume and area of combined shapes in order to present results** For example, the area under a graph for speed/distance calculations and volumes to calculate engine capacity and cylinder bore capacity. Calculations to include: • Area of a triangle: A = ½ base x height • Area of a square and rectangle: A = length x breadth • Area of a circle: $A = \pi r^2$ • Volume of a cylinder: V = $\pi r^2 l$ **Opportunity for applied learning** Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 6: Trigonometric calculations

Suggested teaching time: 6 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
Topic 1.2 Using mathematical processes.	Recap the previous lesson ensuring learners are fully comfortable with completing those calculations. Introduce the lesson relating to calculating angles and sides of a triangle in order to present results using trigonometric applications to solve steering and engine component angles using sine, cosine and tangent. Learners must understand the three formulae: sin, cos, tan and that the sides of the right-angled triangles are known as the hypotenuse, the opposite and the adjacent. The hypotenuse, being the longest side, is always opposite the right angle. The opposite and adjacent sides relate to the angle under consideration. **Example formulas:** sin = opposite / hypotenuse cos = adjacent / hypotenuse tan = opposite / adjacent Learners must be able to select the correct formula to calculate the unknown angle or size given in the question. *(SOHCAHTOA (it sounds like 'Sockatoa') or Some Old Hag Cracked All Her Teeth On Apples as an aide-memoire)* **Opportunity for applied learning** • Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 6: Trigonometric calculations

Suggested teaching time: 6 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources
	• Calculations to include: ○ linear motion of a piston ○ rotary motion of a crankshaft ○ steering angle alignment ○ steering turning circle ○ camshaft lift.	

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Lesson 7: Using graphs to present information

Suggested teaching time: 7 hours

Learning outcome: Analyse vehicle technical data.

Topic	Suggested teaching	Suggested resources

Topic 1.3
 	
Presenting statistical results visually.
	Recap the previous lesson ensuring learners are fully comfortable with completing those calculations.
	
	Introduce the lesson. This lesson is about presenting statistical information using the following methods (ensure several examples are completed):
	• bar charts
	• pie charts
	• frequency tables and curves
	• line graphs
	• mean, mode, median and range must be covered in examples.
	
	Opportunity for applied learning
	• Discuss why graphs are a good visual indication of presenting data and ask students to research examples of such data on line or in text books and explain why they have chosen that particular graph.
	• Learners must illustrate in appropriate graphical format the earlier calculations made including the following as examples;
	  ○ comparison of stopping distance (bar charts)
	  ○ linear motion of a piston
	  ○ rotary motion of a crankshaft (sine wave)
	  ○ speed over distance (line graphs)
	  ○ velocity and acceleration (line graphs)
	  ○ comparison of fuel consumption (pie graphs).
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		Science for Motor Vehicle Engineers – P Twigg
		
		Elsevier Limited
		
		ISBN-13: 978-0340645277

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Lesson 8: Calculating frictional forces **Suggested teaching time:** 7 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources
Topic 2.1 Forces and laws of friction.	Introduce the topic and explain that learners will need to calculate mathematical problems involving friction and force. Example calculations to include the calculation of torque and power transmitted in at least two different clutch types (eg single plate, multi plate, dry and wet clutches). **Torque transmitted by a clutch is: T = SPμr** where T = torque (Nm), S = number of pairs of friction surfaces, μ- coefficient of friction and r = mean radius (Metres). **Power transmitted by a clutch is: P = 2πnT** where P = Power (watts), n = speed (rev/second), T = torque (Nm). **Frictional forces between driven surfaces** Calculate the frictional forces between surfaces under different conditions (eg dry, lubricated): Example calculation: Coefficient of friction μ = sliding frictional force/force between surfaces. **Opportunity for applied learning** Using the examples given, learners must be able **to carry out calculations** relative to those above using a wide range of whole numbers and decimal numbers.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 9: Calculating torsional stress and tensile strain **Suggested teaching time:** 6 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources
Topic 2.1 Forces and laws of friction.	Recap the previous lesson ensuring learners have a full understanding of the calculations. Introduce the topic and explain that learners will need to calculate mathematical problems involving torsional stress and tensile strain. Learners need to calculate stress and strain using Young's modulus (eg torsional stress on a metal bar, tensile strain on a connecting rod, comprehensive strain on a road spring). **Example calculation:** Stress *E* = load/area (N/m^2) Strain = extension/original length Young's Modulus: *E* = *stress/strain* For example, calculate the tensile stress in a handbrake cable with a cross sectional area of 7mm^2 subject to a force of 490N. Stress = load/area *E* = 490/7 = 70N/mm^2 or 70MN/m^2 Strain = change in length/original length **Opportunity for applied learning** Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 10: Calculating gas laws **Suggested teaching time:** 8 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources
Topic 2.2 Gas laws.	Recap the previous lesson ensuring learners have a full understanding of the calculations. Introduce the topic and explain that learners will need to calculate mathematical problems involving gas laws namely Boyles law, Charles law and the gas equation. Learners will need to compare gas laws to calculate vehicle related problems. **Charles law** Charles law states: The volume of a fixed mass of gas at constant pressure expands by 1/273 of its volume at 0°Celsius per °Celsius rise in temperature. *(-273℃ is known as absolute zero on the Kelvin scale. To convert ℃ to Kelvin (k) add 273 to the Celsius value).* Charles law formula: $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ Where V_1 is initial volume and T_1 is initial temperature, V_2 is final volume and T_2 is final temperature. By transposing the formula the unknown value can be determined. Example: A gas in a cylinder has a volume of 60cm^3 at 27℃. What is the volume of the gas at 77℃? $V_1 = 60$ $V_2 = ?$ $T_1 = 27 + 273$ $T_2 = 77 + 273$	

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Lesson 10: Calculating gas laws **Suggested teaching time:** 8 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources
	Transposition of formula: $\frac{V_2 = V_1T_2}{T_2}$ $V_2 = 60 \times \frac{350}{300}$ $V_2 = 70cm^3$ **Boyles law** Boyles law states: The volume of a fixed mass of gas is inversely proportional to the pressure, provided the temperature remains constant. Boyles law formula: $p_1/V_1=/p_2V_2$ Where p_1 is initial pressure and V_1 is initial volume, p_2 is final pressure and V_2 is final volume. By transposing the formula the unknown value can be determined. Example: An engine cylinder contains $480cm^3$ of air at an absolute pressure of 1 bar. Assuming the temperature is constant, what will be the absolute pressure when the volume is reduced to $60cm^3$? $p_1 = 1$ bar $p_2 = ?$ $V_1 = 480\ cm^3$ $V_2 = 60cm^3$	

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Lesson 10: Calculating gas laws **Suggested teaching time:** 8 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources
	$p_2 = p_1V_1/V_2$ $p_2 = 1 \times 480/60$ $p_2 = 8$ bar **The gas equation** This takes into account changes of state for three variables. For example: The gas in an engine cylinder is compressed, burned and expanded under conditions which are neither truly those of Charles or Boyles laws but a combination of each. In practice, all three quantities – pressure, volume and temperature – change their values and pV/t = a constant and is termed the gas equation. The gas equation formula: $p_1V_1/t_1 = p_2V_2/t_2$ Example: A cylinder contains $0.3m^3$ of gas at a pressure of $105\ kN/m^2$ and a temperature of 32℃. At the completion of compression the volume becomes $0.002m^3$ and gas temperature 298℃. Calculate the new absolute pressure. Transposition of formula gives: $p_2 = p_1V_1t_2/t_1V_2$ $p_2 = 105 \times 0.3 \times 571/305 \times 0.002$ $p_2 = 29.48MN/m^2$ **Opportunity for applied learning** Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	

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Lesson 11: Calculating ratios and leverages **Suggested teaching time:** 7 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems

Topic	Suggested teaching	Suggested resources
Topic 2.3 Machines – the use of ratios and levers.	Recap the previous lesson ensuring learners have a full understanding of the calculations. Introduce the topic and explain that learners will need to calculate mathematical problems involving ratios and levers. Learners will need to calculate ratios and leverage in the following vehicle systems: • steering linkages • gearboxes • final drives • compression ratios • engine ancillary drive system pulleys • levers (eg braking systems, clutch operating systems). Example formula: • Movement ration = distance moved by effort/distance moved by load where effort is the input force and load is the output force. • Force ratio = load/effort • Efficiency = force ratio/movement ratio Example calculations When applied to a gearbox: • movement ratio is gear or speed ratio • force ratio is the torque ratio and • efficiency = torque ratio/gear ratio.	Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 11: Calculating ratios and leverages **Suggested teaching time:** 7 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems

Topic	Suggested teaching	Suggested resources
	Calculate the gear ratio of the following: Gear ratio = driven/driver x driven/driver Gear ratio = 60/30 x 70/20 Gear ratio = 7:1 Given the gearbox efficiency is 75% and the input torque is 70Nm calculate the output torque: Efficiency = torque ratio/gear ratio 0.75 = torque ratio/7 Torque ratio = 0.75 x 7 Torque ration = 5.25 Torque ratio = output torque/input torque 5.25 = output torque/70 Output torque = 5.25 x 70 Output torque = 367.5Nm **Opportunity for applied learning** Using the examples given, learners must be able to carry out calculations relative to those above using a wide range of whole numbers and decimal numbers.	

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Lesson 12: Workshop experiments **Suggested teaching time:** 8 hours

Learning outcome: Apply scientific and mathematical principles to solve vehicle related problems.

Topic	Suggested teaching	Suggested resources

Topic 2.4
 	
Simple workshop experiments.
	Recap the previous lesson ensuring learners have a full understanding of the calculations.
	
	Introduce the topic and explain that learners will need to perform simple workshop experiments to demonstrate the theory from this learning outcome.
	
	Opportunity for applied learning
	
	• Learners are to carry out simple experiments in the workshop or classroom and examples of such experiments are given below. *Other related experiments can be employed*.
	  ○ The friction present when pulling by hand a mass of metal over another and then changing the mass of the moving metal object and applying a lubricant between the two surfaces.
	  ○ The difference in elasticity on a range different objects by test equipment or simply pulling effort.
	  ○ Place an increasing number of objects on top of a large piston/syringe stood on its end. Identify the change in force or effort required to close the piston. Measure the cross sectional area of the piston, the total weight exerted, and the volume, Boyle's law can be proved. Plot the results to represent this behaviour.
	  ○ Using a socket on a tight wheel bolt use differing lengths of knuckle bars to undo the bolt thus demonstrating the relation between force and distance.
	
	• Once the learners have completed the experiments they can discuss and present their findings to the group expressing the learning that took place by carrying out these experiments.	

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Lesson 13: Engine performance characteristics

Suggested teaching time: 7 hours

Learning outcome: Understand engine performance testing.

Topic	Suggested teaching	Suggested resources
Topic 3.1 Engine performance characteristics.	Introduce the topic area and lesson by explaining what data can be derived from carrying out engine tests and the relevance of this data. Discuss with learners what they feel each engine characteristic means and give examples of different characteristics and their applications. The engine characteristics to include: • power – brake power and indicated power • torque • mechanical efficiency • volumetric efficiency. **Opportunity for applied learning** The learners must research the engine characteristics as shown and produce a report highlighting the following; • The definition of each characteristic. • An example of each characteristic from two different engine types. • A rational of why their chosen characteristics are different (application and use). The information in this report will be used in a further lesson to graphically represent their findings.	www.dynomitedynamometer.com/ Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes Heinemann, 1st edition ISBN-13: 978-0435075644 Science for Motor Vehicle Engineers – P Twigg Elsevier Limited ISBN-13: 978-0340645277

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Lesson 14: Engine dynamometers

Suggested teaching time: 6 hours

Learning outcome: Understand engine performance testing

Topic	Suggested teaching	Suggested resources

Topic 3.2
 	
Engine dynamometers.
	Recap the previous lesson ensuring learners have a full understanding.
	
	Introduce the topic area and lesson by explaining what an engine dynamometer is and does.
	
	Discuss with learners why a dynamometer test is relevant and the different reasons for carrying out engine testing.
	
	Explain and discuss with learners the difference between an engine dynamometer and a chassis dynamometer.
	
	Opportunity for applied learning
	• Learners to compare the differences between an engine and chassis dynamometer. Compare chassis dynamometer types to include:
	  ○ inertia
	  ○ brake (electricity and fluid).
	• Learners can then produce a report explaining the difference between an engine dynamometer and a chassis dynamometer with an explanation for the use of each type. This can include:
	  ○ manufacturer testing
	  ○ comparison testing
	  ○ performance testing
	  ○ new build testing.
	• Learners can the present their findings in a media presentation of their choice.
		www.tdi-plc.com/chassis-dyno-best/
		
		www.engineprofessional.com/downloads/ep10/EP04-2010_34-39.pdf
		
		www.dynomitedynamometer.com/
		
		Principles of Light Vehicle Technology Candidate Handbook: Level 3 – G Stoakes
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		Science for Motor Vehicle Engineers – P Twigg
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Lesson 15: Graphical representation of test results

Suggested teaching time: 6 hours

Learning outcome: Understand engine performance testing.

Topic	Suggested teaching	Suggested resources

Topic 3.3
 	
Presenting engine test results graphically.
	Recap the previous lesson ensuring learners have a full understanding of the topic.
	
	Introduce the lesson by explaining why engine test results should be published and discuss with the learners what format would best represent engine performance data graphically and why.
	
	It is important that the issue of ensuring the scaling of graphically represented data is accurate to give a true representation of the data.
	
	Opportunity for applied learning
	• The learner must use engine test data collated in a previous lesson to present graphically the two different engine data findings to include:
	  ○ torque and power (eg indicated and brake)
	  ○ mechanical efficiency (eg engine losses and drivetrain losses)
	  ○ thermal efficiency
	  ○ volumetric efficiency.
	• In their presentation learners must give an understanding of why the two engines' characteristics are different and how this is represented on the graphs presented.
		http://rototest-research.eu/?DN=29
		
		www.dynomitedynamometer.com/
		
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