GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

REMOTE LEARNING ACTIVITY BOOK (RELAB)
SUBJECT: AUTOMOTIVE
GRADE: 10

LEARNER WORKBOOK

GGT2030
GROWING GAUTENG TOGETHER

INTRODUCTION AND PURPOSE OF THE RELAB

The Covid 19 pandemic has caused serious impact to schooling resulting in major learning loss and instructional time. This scenario has resulted in school implementing rotational timetables-where learners attend school on alternate days or weeks. The Remote Learning Activity Book was conceptualized to engage learners in constructive learning on days they are at home. Hence the RELAB was developed as a strategy to enhance remote learning.

The RELAB is underpinned by the following Legislative demands:

a) Responding to GDE Strategic goal 2 promoting quality education across all classrooms and schools
b) **DBE Circular S13 of 2020** the requires the GDE to support the implementation of the Recovery Annual Teaching Plan (RATP)
c) **GDE Circular 11 of 2020** requiring districts to issue Learning Activity Packs to support schools for lockdown learning. Understanding learning constraints at home as majority of learners do not have access to devices or data to use for online learning. Many households are depending on schools to provide them with learning resources packs

RELAB is designed as workbook with activities based on the Revised Annual Teaching Plan. The exercises are pitched at a standard to expose learners at Grade 10 & 11 to content at different cognitive levels. The NSC diagnostic reports in different subjects have revealed that learners fail to analyse questions and as a result fail to respond accordingly.

The RELAB is intended to ensure that learners work on exercises that consolidate and reinforce topics taught while at school. These exercises are be completed at home and would receive feedback as groups or individually when at school. It is therefore of paramount importance that teachers assess the work with learners in class, as a way of providing constructive feedback. Teacher are also required to diagnose learner responses, remediate where necessary and plan further intervention.

Educators are encouraged to create whatsapp groups to remind learners on what is expected of them in a particular week/ day(s). Effective utiisation of the RELAB activity book would further ensure that all topics in the RATP are covered simultaneously. Feedback from learners at home will confirm usage of the RELAB material and assist to prepare learners for formal assessments.

Automotive- Topics

1. **Safety – Generic**
2. **Tools – Generic**
3. **Engines- Generic**
4. **Engines- Specific**
5. **Joining Methods - Generic**
6. **Forces- Generic**
7. **Maintenance - Generic**
8. **Terminology- Drive Trains**
9. **Maintenance- Specific**
10. **Systems and Control – Specific (Mechanical)**
11. **Systems and Control – Specific (Electricity)**

TERM 1

Activities

TOPIC:SAFETY

1. Write a short paragraph about your understanding around the following issues about HIV/AIDS:

- Your understanding about the illness and its causes
- How it affects our community and specially in the workplace
- How to prevent HIV/AIDS

2. Explain why you think if it is important to know your status? In your opinion, why do you think it is important to have first aid kits?
3. Name at least 10 basic contents that must be in a first aid kit.

4. Occupational Health and Safety

Activity 5.1 - Multiple-choice questions

5.1.1. Workplace related injuries, illnesses and deaths impose costs upon?

(a) Employers
(b) Employees
(c) The community
(d) All of the above

5.1.2. What are the most common injuries in the hospitality industry?

(a) Sprains and strains
(b) Being hit by falling objects
(c) Falls
(d) Sun-related injuries

5.1.3. What does the provision of security of people's assets while at the workplace entail?

(a) Having all assets under lock and key
(b) Preventing theft, pilferage and damage of assets
(c) Being vigilant with the security of the assets
(d) Issuing security badges and identity cards to all people at the workplace

5.1.4. What is the primary emergency telephone number in South Africa?

(a) 011

(b) 177

(c) 012

(d) 112

5.1.5. What is the role of the workplace's health and safety representative?

(a) To represent the workers' views and concerns on the workplace's OH&S practices to the employer

(b) To document the workplace's OH&S policies and practices

(c) To check on whether all workers are complying with the workplace's OH&S policies and practices

(d) To train and assess all workers in their knowledge of the workplace's OH&S policies and practices

5.1.6. Which of the following is not a type of health hazard?

(a) Magical

(b) Ergonomic

(c) Chemical

(d) Biological

5.1.7. What is the most important reason why all accidents should be investigated and recorded?

a Comply with health and safety law

b Satisfy the enforcement officer

c Prevent similar accidents in the future

d Something to read on the loo

5.1.8. What is the best way to protect an employee working at a noisy machine?

(a) Allow the machine to only be used for short periods of time

(b) Reduce or eliminate noise from the machine

(c) Provide a pair of ear muffs

(d) Shout really loudly at them when they do something wrong

5.1.9. Under the Health and Safety Act, an employer must:

(a) Provide a bright, cheerful place to work

(b) Provide personalized hard hats in a variety of colours

(c) Give everyone their very own copy of company safety policy

(d) Safeguard the safety and health of all employees

5.1.10. What is the best way to prevent injury at work?

(a) Remove the hazard or redesign the task

(b) Restrict access to the hazard

(c) Provide gloves and a bobble hat

(d) Send all employees home - they'll much safer there

5.1.11. Define ergonomics.

(a) The biology of the relations and interactions between organisms and their environment

(b) The interaction between people, equipment and their environment

(c) A study of the production, distribution, and consumption of goods and services

(d) A study of big and clever words

Activity 5.2 - True or false questions

Highlight or circle the correct answer or enter your answer in the space provided.

Answer true or false about occupational health and safety

5.2.1.	Emergency procedures have been devised to keep everyone safe.	True	False
5.2.2.	A hazard is any situation that has the potential to cause injury, illness, or death.	True	False
5.2.3.	If no notification is made of an injury sustained compensation can be obtained for that injury.	True	False
5.2.4.	To reduce injury, a risk control process accompanied by hazard-management procedures needs to be established.	True	False
5.2.5.	Safety signs can prevent accidents.	True	False
5.2.6.	A duty of care in the workplace is the responsibility of the employer only.	True	False
5.2.7.	The direct costs of workplace-related injuries are workers' compensation premiums paid and workers' compensation payments.	True	False
5.2.8.	When providing a safe working environment for staff, employers must eliminate all risks to health and safety.	True	False
5.2.9.	The safety and wellbeing of people in the workplace also includes guests and customers of the workplace.	True	False
5.2.10.	If you have to evacuate the workplace during an emergency, ensure that you take all of your personal belongings before evacuating the building.	True	False

Activity 5.3 – Answer the following Questions

5.3.1. What is the significance of the Occupational Health and Safety Act?

5.3.2. All workers (educators and learners) should know their Human Rights that protect them within a workplace (workshop). These rights are contained in the Bill of Rights, Chapter 2 of the South African Constitution. Mention FIVE human rights within the workplace.

5.3.3. Your employer has the right to monitor communications within the workplace as long as you're aware of the monitoring before it takes place. Mention FIVE communications that can be monitored by the employer within the workplace.

5.3.4. According to the OHS Act both the employer and the employee are responsible for the safety in the workshop. List FIVE responsibilities of the employer and FIVE responsibilities of the employee within a workplace.

5.3.5. What do you understand by the term housekeeping?

5.3.6. Mention TEN general safety measures that must be followed to ensure safety in a mechanical workshop.

5.3.7. A workplace hazard is anything that has the potential to cause harm to a person. Health and safety hazards exist in every workplace. Give FOUR workplace hazards and also provide a brief description of each.

5.3.8. Planning and the proper workshop layout will enable you a good and pleasant work. When planning the workshop layout, it is necessary to consider a number of factors that affect your work. Mention FIVE factors that must be considered when planning the workshop layout.

5.3.9. What is the definition of an accident?

5.3.10. Unsafe conditions are the cause of many accidents. Name five unsafe conditions in a mechanical workshop

5.3.11. It has been found that unsafe actions, more so than unsafe conditions are the root cause of the vast majority of occupational injuries and accidents. Give FIVE unsafe acts that may transpire in a mechanical workshop.

5.3.12. Name four basic safety colours and explain the significance of each.

COLOUR	MEANING OR PURPOSE	INSTRUCTION & INFORMATION
RED		
YELLOW or **AMBER**		
BLUE		
GREEN		
RED(fire-fighting signs)		

5.3.13. Identify the following signs in an electrical workshop by mentioning their description and colour.

	SIGN	DESCRIPTION	COLOUR
What the group name of this type of signs: Information Signs			
			
			
			
			

	SIGN	DESCRIPTION	COLOUR
What is the group name of this type of signs: ***Safety Signs***			
			
			
			
			

	SIGN	DESCRIPTION	COLOUR
What is the group name of this type of signs: **Prohibition Signs**			
			
			
			

	SIGN	DESCRIPTION	COLOUR
			
			
			
			
			
			

	SIGN	DESCRIPTION	COLOUR
What is the group name of this type of signs: ***Regulatory Signs***			
			
			
			
			

Activity 5.4

5.4.1. All the electrically operated equipment must have a disconnecting device, to make it easy to break the circuit in case of emergency. Where must the main switch be placed on an electrical machine?

5.4.2. All domestic installation must have a disconnecting device, to make it easy to break the circuit in case of emergency. Where should the main switch of a domestic installation be placed?

5.4.3. Briefly describe the meaning of critical and non-critical emergencies.

5.4.4. You are busy in the mechanical workshop busy using the welders, when, all of a sudden the transformer catches fire. Which class of fire is it and how you would extinguish that fire?

5.4.5. What are the main causes of electrical fire?

5.4.6. Fires are divided into different classes. Name the main classes of fires as well as the extinguishers to be used to extinguish these fires.

Activity 5.5

5.5.1. Name the main causes of electrical shocks.

5.5.2. Explain the steps that must be taken to help a person who has been electrocuted.

5.5.3. In the event of an emergency in a mechanical workshop, certain steps need to be taken for successful evacuation of the workshop. Name at least five steps for a successful evacuation.

5.5.4. Why must you work in a well-ventilated room when you etch a PCB?

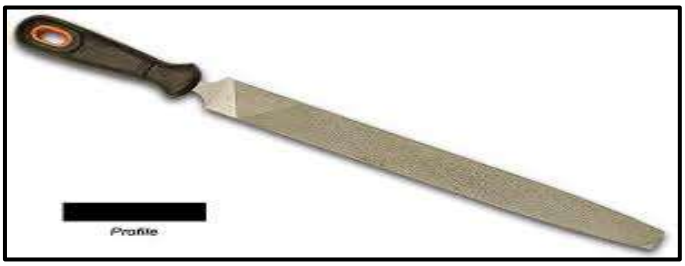
5.5.5. Mention SIX precautions to be taken when making a PCB.

Safety - Hand tools

6.1. Describe how you would use the following tools safely:

6.1.1. 

6.1.2. 

6.1.3. 

6.1.4. 

6.1.5. 

6.1.6. 

6.1.7. 

6.1.8. 

6.2. Describe the safety precautions that must be observed when working with the following machine:

7.1.1. Name four safety precautions to follow when working with a lathe or a milling machine.

7.1.2. Name five safety precautions to observe when working with a grinding wheel.

7.1.3. Name five steps to follow when installing a grinding wheel.

7.1.4. Name three safety precautions you must observe when working with a bender.

7.1.5. Name six safety precautions that you must observe when working with a power saw.

TOOLS

1.1. When should you use an open-ended spanner?
1.2. Which accessories can be used with ratchets, and specify where each of them can be used.
2.1. Name the pliers that you must use to cut a split-pin.
2.2. Where would you use long nose pliers?

3.1. Answer the following questions on hammers:
- 3.1.1. Name the three parts of a hammer.
- 3.1.2. Name four properties of a good hammer shaft.
- 3.1.3. Give two uses of the ball pein hammer.
- 3.1.4. How is the shaft fitted to the hammer?
- 3.1.5. Explain the use of a soft face hammer.

4. Explain in your own words why Phillips screwdrivers are preferable to flat screwdrivers.
5. Where would you use Allen keys?
6. Answer the following questions on hacksaws:
6.1. Name two types of frames.
6.2. How are the blades classified?
6.3. How is the length of the blade determined?
6.4. Why are the teeth of hacksaw blades set?
7. Name four methods of classifying files.
8. What are the angles of the cut of a double-cut file?
9.1. Name four types of chisels and their uses.
9.2. Name four aspects to consider when using a chisel.
9.3. Why must the cutting edge of the flat chisel be slightly curved?
10.1. Name three different types of files.
10.2. How is the coarseness of file different?
10.3. Explain where you would use the following files:
a) Flat files
b) Square files
c) Round files
d) Half-round files
e) Three-square files
10.4. Describe a safety precaution when handling files regarding file handles.
9.1. What is an engineer’s square made of?
9.2. Explain briefly how to test a work piece for square-ness using an engineer’s square.
12.1. Explain what you can do with the square and blade of a combination set.

12.2. Explain how you can use the protractor head alone to determine the incline of a work piece.

12.3. Explain how you will determine the centre on a round work piece with a combination set.

13.1. State the use of a steel tape.

13.2. What is the case made of?

14.1. Name the material that a steel rule is made of.

14.2. How should you look after a steel rule?

15.1. Give the correct use of the scriber.

15.2. What material is a scriber made of?

16.1. Name the included angles of a:

(a) Prick punch

(b) Centre punch

16.2. When would you use a prick punch?

16.3. What materials are punches made from?

WEEK 5

Activity 1

Topic: Engines:	**Two and four stroke internal combustion engines**
Objectives	• Learner must identify and describe functions of various engine components of 2 and 4 stroke single cylinder spark ignition engine, and also explain relevant concepts.

Number	**Question**	**Describe function of component or part**
1.	Make a neat sketch of the four-stroke internal combustion engine and **label the nine** important parts.	
2.	Explain the following terms: • Intake stroke • Bottom dead centre • Engine Stroke • Engine Cycle	_____ _____ _____ _____ . _____ _____ _____ _____ _____ . _____ _____ _____ _____ _____ _____ _____ _____ _____ .

3. Describe the operation of the four-stroke petrol engine under the following sub-headings:	• Intake stroke • Compression stroke • Power stroke • Exhaust stroke	_____ _____ _____ _____ _____ . _____ _____ _____ _____ _____ . _____ _____ _____ _____ _____ . _____ _____ _____ _____ .
4. Compare the designs in pistons of the **two-stroke** and the **four-stroke** petrol engines**.**	• Two-stroke • Four-stroke	_____ _____ _____ _____. _____ _____ _____ _____ .

5. Make a neat sketch to indicate the position of the three ports in a two-stroke engine, relative to the cylinder and piston.		
6. Explain the term "scavenging".		_____ _____ _____ _____ .
7. Briefly describe the complete operation of the three-port two-stroke petrol engine.	• When piston goes up:	_____ _____ _____ _____ _____ _____ .
	• When piston goes down:	_____ _____ _____ _____ _____ .
8. List the **main differences** between the **two-stroke** and the **four-stroke** petrol engines.	• Two Stroke	_____ _____ _____ _____ _____ .
	• Four Stroke	_____ _____ _____ _____ _____
9. Name the dangerous gas that vehicles emit that pollutes the atmosphere.		_____ .
10. State four advantages of		• _____

fuel-injection.	_____ _____ • _____ _____ _____ • _____ _____ _____ • _____ _____ _____
11. Name four disadvantages of fuel-injection.	• _____ _____ _____ • _____ _____ _____ • _____ _____ _____ • _____ _____ _____

Activity 2

Grade 10	Term: 1	Week No:	**5**	Class	
Topic: Engines:	**Two and four stroke internal combustion engines**				
Objectives	• Learners must be able to illustrate the operation of 2 and 4 stroke single cylinder spark ignition engine.				

Use SKETCHES to describe the following:

1. The operation of the **intake-stroke** of the **four-stroke compression ignition** engine		
2. The operation of the **power stroke** of the **four-stroke C.I.** engine.		
3. The operation of the **'Uniflow'-type two-stroke** engine.		
4. The operation of the **port-type two-stroke C.I. engine** during the **exhaust** and **intake**	• Exhaust stroke	

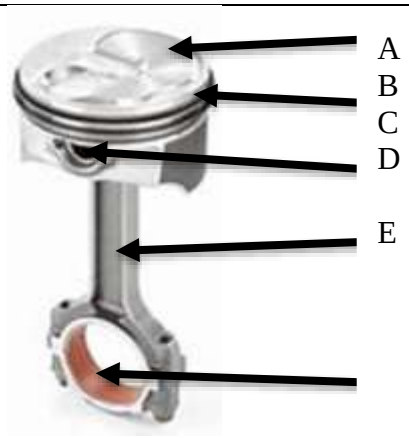
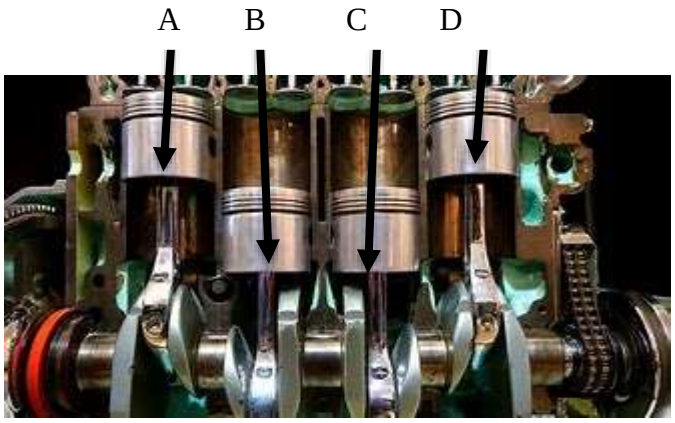
stroke	• Intake stroke	

Activity 3

Grade 10	Term: 1	Week No:	**6**		
Topic: Engines:	**Two and four stroke internal combustion engines**				
Objectives	• Learner must be able to show more understanding on 2 and 4 stroke single cylinder spark ignition engine.				

Answer the following questions:	**Statement or choice or procedure**	**Correct answers**
1. Is the statement on the right block **true** or **false**?	• In a two-stroke engine, the working cycle is completed in two revolutions of the crankshaft.	_____ _____ _____ _____ .
2. A two-stroke cycle engine gives ……. the number of power strokes as compared to the four-stroke cycle engine, at the same engine speed.	• Half • Same • Double • Four times	_____ _____ _____ _____ _____ _____ _____
3. Is the statement on the right block **true** or **false**?	• A two-stroke cycle engine occupies larger floor area than a four-stroke cycle engine.	_____ _____ _____ _____.

4. A two-stroke engine gives ……. mechanical efficiency than a four-stroke cycle engine.	• Higher • Lower • Equal • None of the mentioned	_____ _____ _____ _____ _____ _____ .
5. Is the statement on the right block **true** or **false**?	• The two-stroke cycle engine have lighter flywheel.	_____ _____ _____ .
6. Thermal efficiency of a two-stroke cycle engine is ……. a four-stroke cycle engine.	• equal to • less than • greater than • none of the mentioned	_____ _____ _____ _____ _____ _____
7. In a petrol engine, the mixture has the lowest pressure at the ……	• beginning of suction stroke • end of suction stroke • end of compression stroke • none of the mentioned	_____ _____ _____ _____ _____ .
8. In compression ignition engines, swirl denotes a …….	• haphazard motion of the gases in the chamber • rotary motion of the gases in the chamber • radial motion of the gases in the chamber • none of the mentioned	_____ _____ _____ _____ _____ _____ _____ .
9. The injector nozzle of a compression	• inject fuel in a chamber of high pressure at the end of compression stroke.	_____ _____ _____

ignition engine is required to inject fuel at a sufficiently high pressure in order to ……	• inject fuel at a high velocity to facilitate atomization. • ensure that penetration is not high • all of the mentioned	_____ _____ _____ _____ _____ .
10. Which of the engines on the right will have heavier flywheel than the remaining ones?	• 30 kW four stroke petrol engine running at 1500 r.p.m. • 30 kW two stroke petrol engine running at 1500 r.p.m. • 30 kW two stroke diesel engine running at 750 r.p.m. • 30 kW four stroke diesel engine running at 750 r.p.m.	_____ _____ _____ _____ _____ _____ .
11. Label the part of an engine on the right:	 	A_____ . B_____ C_____ . D _____. E _____.
12. In the engine on the right, are four pistons. Indicate which pistons are at TDC and which are at BDC:	 	A _____. B _____. C _____. D _____.

13. **Group Work** - Practical Activity
 	
Four-stroke engine:
	• Make a sketch of a simple four stroke engine.
	• **Make** now the following **components out of Perspex and assemble them** to be show on an overhead/data projector or take them a picture.
	  ○ Piston
	  ○ Connecting rod
	  ○ Crankshaft
	  ○ Cylinder valves (Inlet/outlet) {**All components must be labelled on the model.**}	

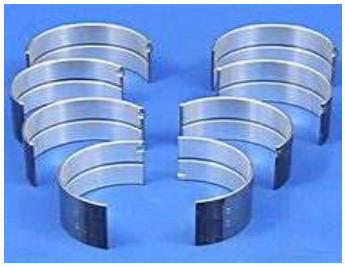
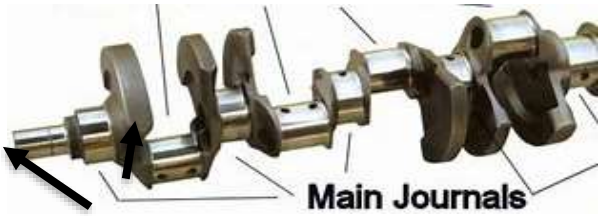
WEEK 7 – 8

Activity 4

Grade 10	Term: 1	Week No:	**7**	Class	
Topic: Engines:	**Two and four stroke internal combustion engines: Identification and function of components**				
Objectives	• Learner must identify and describe functions of various engine components of the 4-stroke 4 cylinder spark ignition engine.				

Identify component/Part:	**Component Identified**	**Describe function of component or part**
1. Piston	Piston crown 	_____ _____ _____ _____
	Oil ring groove  	_____ _____ _____ _____ _____
	Compression ring groove 	_____ _____ _____ _____ _____ .
		_____ _____ _____ _____ _____

Gudgeon pin

2. Connecting rod	Small end 	_____ _____ _____ _____ .
3. Bearings	  	_____ _____ _____
4. Crankshaft	Main journal 	_____ _____
	Big end journal	

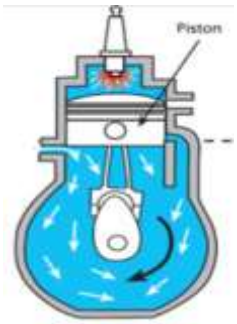
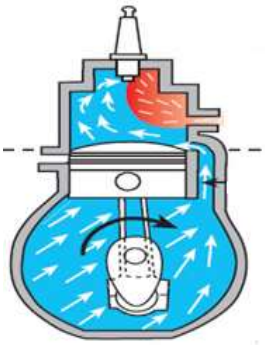
<table>
<tr><td></td><td colspan="2"> 

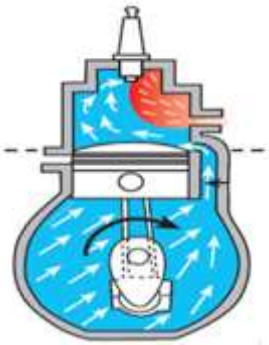
_____
_____ .</td></tr>
<tr><td rowspan="3">5. Camshaft</td><td>Cam lobe
  </td><td>_____
_____
_____
_____</td></tr>
<tr><td colspan="2">Crank gear
 
_____
_____ .</td></tr>
<tr><td>Camshaft gear
  </td><td>_____
_____
_____
_____ .</td></tr>
<tr><td>6. Valves</td><td> 
  </td><td>_____
_____
_____ .</td></tr>
</table>

7. Valve springs		_____ _____ _____ .
8. Valve lifter		_____ _____ _____ .
9. Flywheel		_____ _____ _____ _____ .
10. Cylinder head	 _____ _____ .	
11. Cylinder block/Engine block		_____ _____ _____.
12. Oil pump	  _____ _____	

13. Manifolds	Intake  _____ _____ .	
	Exhaust 	_____ _____ _____ _____
14. Carburettor		_____ _____ _____ ._____
15. Water pump		_____ _____ .
16. Gaskets		_____ _____ _____
17. Seals	 _____ _____	

Activity 5

Grade 10	Term: 1	Week No:	**8**	Class:	
Topic: Engines:	**Construction of a 2 Stroke engine**				
Objectives	• Learners must be able to show understanding on 2 Stroke engines.				
Complete the tasks below	**Component identified**	**Function**			
Identify **Inlet port** Describe the function of the inlet port.		_____ _____ _____ _____ _____ _____ .			
Identify **Outlet port** Describe the function of the outlet port.		_____ _____ _____ _____ _____ _____ _____ .			

Identify **Transfer port** Describe the function of the transfer port.		_____ _____ _____ _____ _____ _____ _____ _____ _____ .
Give the number of Crankshaft rotations to complete the cycle in:	a. Two Stroke b. Four Stroke	_____ . _____ .

Activity 6

Grade 10	Term: 1	Week No:	**9**		
Topic: Engines:	Conventional Lay outs				
Instruction to learner:	• List 10 different vehicles from various manufacturers • Describe the drive train lay-out of each • **Complete work sheet below**				
Objectives:	• Learners must show clear understanding of vehicles drive train lay-outs.				

Vehicles	**Describe drive train lay-out of each**
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____ .
6. _____	_____ .
7. _____	_____ .
8. _____	_____ .
9. _____	_____ .
10. _____	_____

TERM 2

WEEK 1

Joining Methods

Activity 1

1. What is a semi-permanent joining application?
2. Which five factors will help you decide on an appropriate bolt or machine screw for a bolted joint?
3. Give an example of where studs are often used.
4. Name the five categories that locking devices are divided into and sketch an example of each type.
5. Why are locking devices so important?
6. Give a brief description of how a solid riveted joint is set up. Use a sketch to clarify your explanation.
7. Sketch three different types of blind rivet and mention where they are commonly used.
8. State one use for each of the following machine pins:
    - hardened and ground dowel pins,
    - taper pins,
    - clevis pins and
    - cotter pins.

WEEK 2

Activity -Forces

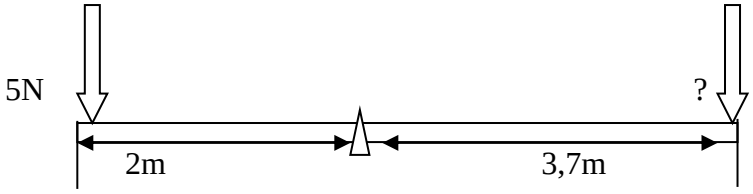
4.1. Describe what you understand to be tensile, compressive and shear stress. Use illustrations to assist you in your description.

4.2. Explain how you would demonstrate shear stress.

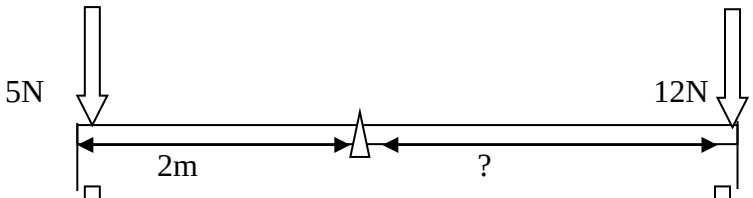
Moments of force

Investigate the following questions regards moments of force. By means of calculations, determine the unknown element in each question. All the beams must be in equilibrium.

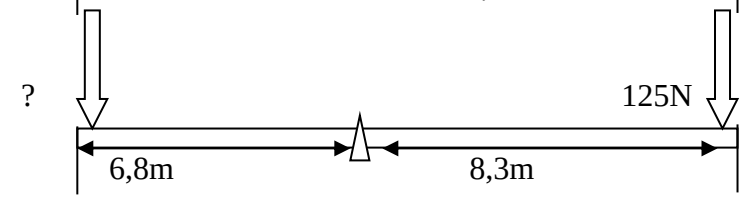
1)



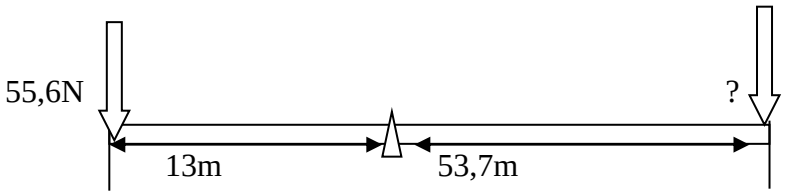
2)



3)



4)



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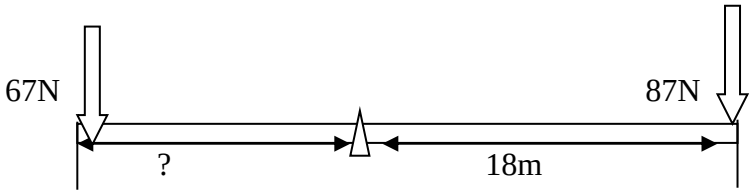

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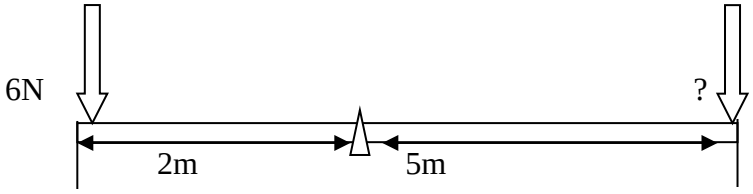

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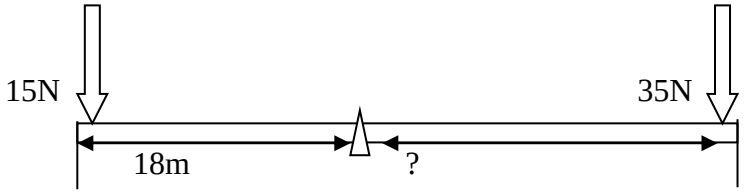

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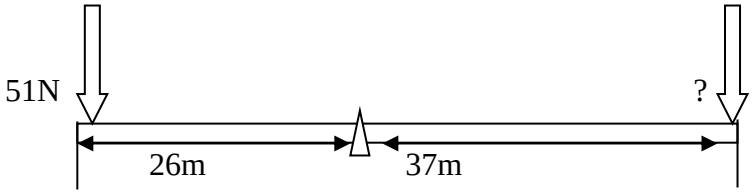


WEEK 3

Activity - Maintenance

1) The primary purpose of motor oil is:
2) What happens if an engine is run low on oil?
3) What is the SAE rating?
4) What does the term "viscosity" mean?
5) Who establishes the viscosity standards?
6) What is a multi-grade oil?
7) What does the "W" stand for?
8) What viscosity oils are generally recommended for today’s new cars?
9) What does API stand for?
10) What does "Service" oil mean?
11) What are the active ingredients in motor oil called?
12) What do the following additives used in motor oil do?
    a. Pour point depressants
    b. Viscosity index improvers
    c. friction modifiers
13) What determines how often oil should be changed?
14) How do driving conditions affect engine oil?
15) How can you identify high quality oil?
16) What is "Synthetic" oil?
17) What are some of the advantages of synthetic oil?
18) When would synthetic oil be used?
19) How often must synthetic oil be changed?

Activity 4

1) What must the viscosity be of cutting fluid?
2) What is cutting fluid?
3) What are the advantages of cutting fluid?
4) Describe how you should maintain cutting fluid.

WEEK 5

Activity 8

1. Describe the following types of maintenance:
    a) Preventive maintenance
    b) Predictive maintenance
    c) Reliability centred maintenance
2. What are the factors that affect the efficiency of preventative maintenance?
3. Describe the difference between preventative maintenance and predictive maintenance.
4. What is the outcome analysis for reliability centred maintenance?

WEEK 6

Activity 9

1. Explain excessive wear.
2. What can the result be of a car engine overheating?
3. What is the most common problem in a car's braking system and name the symptoms that can be observed?

WEEK 7

Activity 10

Basic outcome due to the lack of maintenance

Instructions:

1. Enter the workshop – keeping safety in mind – and identify all the machines in the workshop.
2. Analyse what type of maintenance is needed on the machines.
3. Identify what the outcome may be if there is a lack of maintenance on the machine.

Activity 8

MATERIALS

1. What is an alloy
2. Of which metal is bauxite a source?
3. Into which three categories can the properties of metals be divided?
4. What are the characteristics of a tough metal?
5. What are the three basic materials used in extracting iron form iron ore?
6. What is the basic source of iron and steel?
7. Name three different methods of producing steel.
8. What effect does carbon content have on plain carbon steels?
9. Why are alloying elements added to steel?
10. Describe the following properties of carbon steels:

    (a) Brittleness

    (b) Ductility

    (c) Elasticity

Activity 9

1. Describe Stainless steel.
2. Name at least five different areas where stainless steel is being used with at least 2 uses in each area.

Activity 10

1 Give the uses and properties of the following in table format:

   a) Copper.
   b) Tin
   c) Lead
   d) Zinc
   e) Aluminium

Activity 11

1. Describe Bronze.
2. Name five different types of bronze.
3. Name the uses for bronze.
4. Describe Brass
5. Name the uses for brass.
6. What additives are in *white metal?*
7. Name two uses for white metal.
8. What is *Duralumin*?

Activity 12

ENGINEERING MATERIALS TASK.

Activities Outcome:

- Learners apply and integrate theoretical knowledge in practice.
- Learners to display knowledge through the application of safe procedures and adherence to the specific safety measures when using basic tools and equipment.
- Learner to do research and record their findings in an appropriate academic format. (Teachers to assist)

ENGINEERING MATERIALS

A - Non ferrous metals:

- Copper, tin, lead, zinc, and aluminium

B - Non ferrous alloys:

- Yellow copper, bronze, phosphor bronze, white metal, duralumin, solder and silver solder

TASK:

- Select 10 different engineering materials from group A and B mentioned above
- Collect a sample of each and display the material on a suitable board that is not bigger than an A2, size
- Give two examples of each where this engineering material can be used in the manufacturing world

NOTE:

- Allocate marks according to number of correct answers given in task
- You can make use of marking guide below
- Materials collected by learner must match his selection – e.g. if he/she selected white cast iron his sample must be white cast iron
- Answers on uses must be correct in order for learner to achieve the marks, do not just award a mark the answer must be correct
- The properties and use can be displayed on the board or on separate pages (Teacher give guidance)

Activity 13

TERMINOLOGY – DRIVE TRAINS SPECIFIC

Grade 10	Term: 3	Week No:	2	Class	
Topic: **Terminology:**	**Function, Construction and operation of single plate clutch assembly**				
Learner:	• Complete work sheet below				

Questions	**Answers**
11. Explain the function of the clutch unit in a vehicle	_____ _____ _____ _____ _____ _____
12. Explain what the disengagement of the clutch means	_____ _____ _____ _____ _____ _____
13. What type of material is used as a friction material on the clutch plate?	_____ _____ _____ _____
14. What is the purpose of the clutch master and slave cylinder?	_____ _____ _____ _____ _____ _____

Activity 14

Grade 10	Term: 3	Week No:	2 - 4	Class	
Topic: Terminology:	**Constant mesh manual gearbox**				
Teacher:	• Learner to complete this work sheet using a gearbox from the workshop • This must be done after the lesson on the operation of the gearbox have been completed				
Learner:	• Complete work sheet below using a gearbox in the workshop				

Questions	**Answers**
15. Name all the types of gears that are used in the gearbox (The actual gearbox you are working on)	_____ _____ _____ _____ _____ _____ _____ _____
16. Make a line drawing of the gears/shafts (gearbox and demonstrate the power flow through reverse and top gear. (Teacher can change this to any gears to demonstrate)	**Do this on a separate pièce of paper or in your work book**
17. Explain what synchronisation means with relation to the manual gearbox.	_____ _____ _____ _____
18. What is the function of the synchro ring in the synchro unit?	_____ _____ _____ _____
19. Explain the function of the selector mechanism in the constant mesh gearbox.	_____ _____ _____ _____

	_____ _____ _____ _____

Activity 15

MAINTENANCE SPECIFIC

Grade 10	Term: 3	Week No:	5	Class	
Topic: Maintenance:	**Lubrication systems**				
Learner:	• Complete work sheet below using engines and loose components in the workshop				

Questions	**Answers**
20. Explain the difference between a pressure feed system and a full pressure feed system.	
21. Explain what oil contamination is and why oil gets contaminated over a period of time.	
22. Identify the type of lubrication system drawing A and B represent. (Answer on left side) **A** **B**	
23. Label all components of A and B. 1 2 3	

_____
_____

4

_____
_____

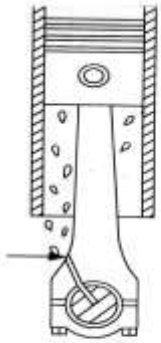
5

_____
_____

6

_____
_____

Drawing A **Drawing B**



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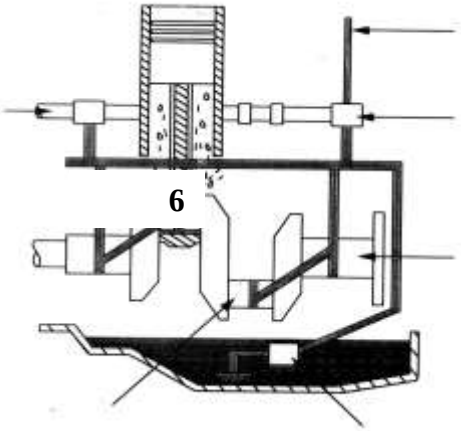

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24. Investigate oil channels in engine block and cylinder head.
    a. Point out main oil channel to teacher in engine block.

    b. Trace all oil channels from oil pump to top of engine.

25. Do a condition report on oil pump, gaskets and seals. Specify which gasket and seals you checked.

Main oil channel:_____
_____
_____ **5**
_____
_____

_____
_____

Trace all oil channels:_____
_____
_____

_____
_____

Condition report:_____
_____
_____
_____
_____

_____
_____

_____
_____

_____
_____

4

Activity 16

Grade 10	Term: 3	Week No:	5	Class	
Topic: Maintenance:	**Temperature control**				
Teacher:	• Demonstrate to learners factors generating heat.				
Learner:	• Complete work sheet below.				

Questions	**Findings/Answers**
26. Explain how the following could generate heat: a. Compressed air b. Friction c. Combustion 27. Why is the term heat engine often used? Explain. 28. Why should heat be controlled in any heat engine? Explain	

Activity 17

Grade 10	Term: 3	Week No:	5 - 7	Class	
Topic: Maintenace:	**Cooling systems - Components used in the cooling system and their function**				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
Explain the difference between direct and indirect air cooling	_____ _____ _____ _____ _____ _____
The following components are part of the cooling system of a vehicle. Explain the function of each. a. Radiator b. Radiator pressure cap c. Water pump d. Thermostat	Radiator_____ _____ _____ _____ _____ _____ _____ _____ _____ Radiator pressure Cap_____ _____ _____ _____ _____ Water Pump_____ _____
What is the function of the by - pass system/port?	_____ _____ _____

Explain what is operating temperature of an engine is.	_____ Thermostat_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Activity 18

Grade 10	Term: 3	Week No:	5 - 7	Class	
Topic: Maintenance:	**Cooling systems - Diagnostics**				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
There should be no need that your vehicle coolant should be topped up regularly e.g. once a week or even every day. This will be an indication that something is wrong. List and explain five possible reasons why coolant could be lost / leaking from your cooling system. There could be various reasons why a vehicle engine is overheating. List any 10 possible mechanical faults that could lead to a vehicle engine overheating.	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Activity 19

Grade 10	Term: 3	Week No:	7	Class	
Topic: Maintenance:	Cooling systems - Diagnostics - Pressure testing cooling system and visual inspection				
Learner:	• Complete work sheet below • Record all your findings				

Questions	**Answers/Explanation**
Do a visual inspection of the cooling system and list the items/areas you checked on the opposite side of the page as well as any faults you found. Use the radiator pressure tester and test the cooling system of a running engine in the workshop. (switched off) Record the steps on how you carried out the test and any findings. **Note:** Method and specifications important. Use a thermostat and test if it is operating correctly for the engine. Record method/steps and any findings on opposite side of the page. **Note:** Method and specifications important.	

Activity 20

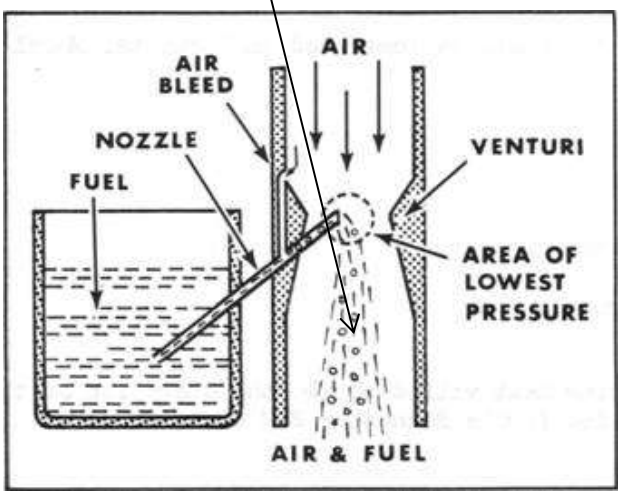
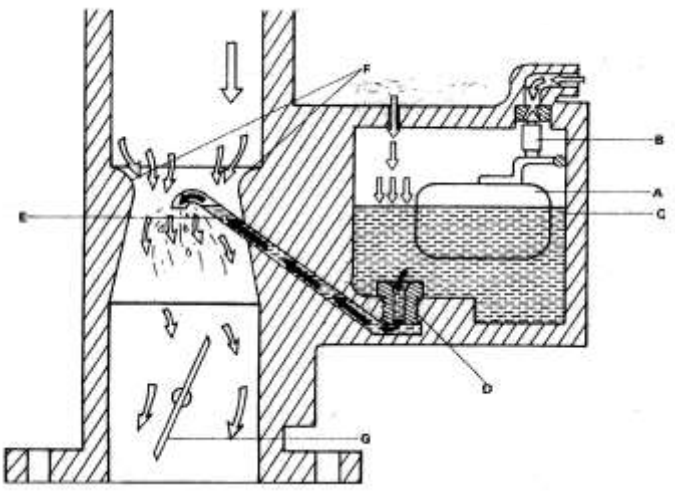
Grade 10	Term: 3	Week No:	7	Class	
Topic: Maintenance:	**Cooling systems - Diagnostics - Checking fluid levels of a vehicle**				
Learner:	• Complete work sheet below • Record all your findings				

Questions	**Answers/Explanation**
Name the fluid levels of a vehicle that should be checked regularly.	
Why is it necessary to maintain correct fluid levels on a vehicle?	
Describe in point form how you would check and top up the brake fluid level.	

Activity 21

SYSTEMS AND CONTROL SPECIFIC

Grade 10	Term: 3	Week No:	8	Class	
Topic: Systems and control:	Basic carburetion - Basic carburation				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
With the aid of a simple sketch explain the venturi principle.	**Venturi principle** 
Label the components of the basic carburettor in opposite column. (A - H)	_____ _____ _____ _____ _____ **Basic carburettor** H 
Explain the construction, function and operation of the float circuit.	

State three functions of the air filter	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Activity 22

Grade 10	Term: 3	Week No:	8	Class	
Topic: Systems and Control:	Hydraulic brake system - Master and wheel cylinders				
Learner:	• Complete work sheet below using actual parts and systems				

Questions	**Answers/Explanation**
Which factors would determine the efficiency of a brake system?	
Make a neat simple sketch to show a lay-out of a simple brake system.	**Simple brake system**
Label the components of the tandem/dual master cylinder.	**Tandem master cylinder** N B D A C E
Why is brake pedal free play necessary between the brake	

pedal and the master cylinder? Explain. Make a neat sketch of a double acting wheel cylinder. Label all components.	_____ _____ _____ _____ _____ _____ **Double acting wheel cylinder**

Activity 23

Grade 10	Term: 3	Week No:	9	Class	
Topic: Systems aand Control:	Hydraulic brake system - Disc brake and shoe assembly				
Learner:	• Complete work sheet below using actual parts and systems to explore				

Questions	Answers/Explanation
Make use of a sketch and explain Pascal's law.	**Pascal's law.** ____ ____
What is the difference between a fixed and floating calliper? Explain.	____ ____ **Explanation:**______________________________ ____
Explain the operation of a double leading brake shoe assembly.	____ ____
What is the function of the parking brake/handbrake?	____ ____
Use the axle or vehicle in the workshop and replace the front brake pads or rear brake shoes. Describe the procedure followed in the opposite column in point form. Use an additional page to write a condition report on Brake Pads/ Shoes and other components	____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____

Activity 24

SYSTEMS AND CONTROL ELECTRICITY SPECIFIC

Grade 10	Term: 4	Week No:	1	Class	
Topic: Systems and control:	Electricity - Electron theory				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
Make use of a sketch to explain the structure of an atom and the movement of the electrons to create electric current.	**Atom Structure** _____ _____ **Explanation:**_____ _____ _____ _____ _____ _____
Explain the difference between a conductor and an insulator.	_____ _____ _____ _____
What is meant by the term "electron drift/speed"?	_____ _____ _____ _____ _____ _____
Do research and give two	

examples where pulse with modulation is used in a motor vehicle. Give two examples each of where digital and analogue signals could be used in a motor vehicle. Explain briefly the effects of electricity.	_____ _____

Activity 25

Grade 10	Term: 4	Week No:	1	Class	
Topic: Systems and control:	Electricity - Characteristics of magnetism - Electromagnets				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
List six characteristics of magnetism.	_____ _____ _____ _____
Explain the difference between a permanent magnet and an electromagnet.	_____ _____ _____ _____
How can the magnetic filed strength of a solenoid be increased or decreased? Name two methods.	_____ _____ _____ _____ _____
Give two examples of where electromagnetic fields or solenoids are being used in a vehicle.	_____ _____ _____ _____
What did Oersted's theory prove? Explain.	_____ _____ _____ _____ _____ _____ _____ _____ _____

Activity 26

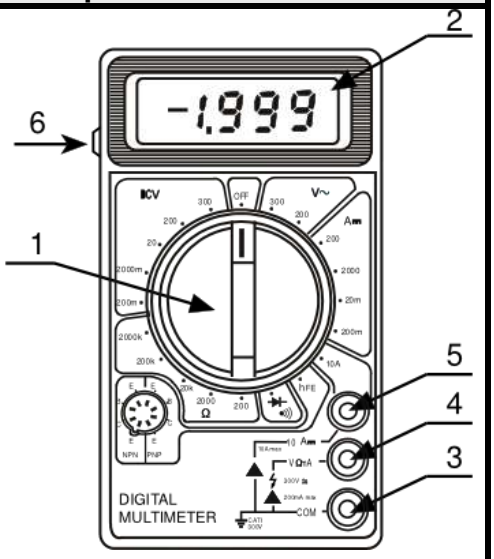
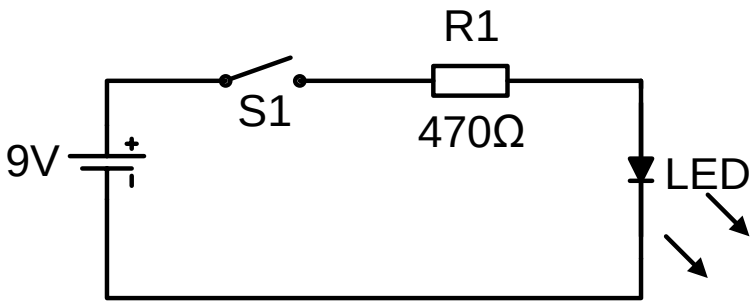
Grade 10	Term: 4	Week No:	1 - 2	Class	
Topic: Systems and control:	Electricity - Electrical units and measurements				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
Define Ohm's Law	
Name the unit and symbol for the following: e. Amount of current flowing through a conductor at a certain point. f. External energy that forces current to flow in a conductor. (Potential difference) g. Resistance.	**Current**
Calculate the value of current flowing when a 10 Ωresistance is connected to a potential difference of 200 V? Also draw the circuit.	External energy Resistance
Calculate the potential difference (V) when a current of	

20 A flows through a 5 Ω. Also draw the circuit.	Circuit _____ _____ _____ _____ _____ _____ _____ _____
Calculate the value of resistance required when a pressure of 24 V is applied causing a current of 12 A to flow.Also draw the circuit.	Circuit _____ _____ _____ _____ Circuit _____ _____ _____ _____

Activity 27

Grade 10	Term: 4	Week No:	2	Class	
Topic: Systems and control:	Electricity - Use of the multimeter - Basic series and parallel circuits				
Learner:	• Complete work sheet below				

Questions	**Answers/Explanation**
Most mustimeters have the following jacks available to plug in either the red or black cable. Which colour cable would you plug into the following jacks: h. COM(3) i. VΩmA(4) j. 10A(5)	_____ _____ _____ _____ _____ 
The multimeter has many uses. Explain how you would use it to measure the voltage of a 12 V battery.	_____ _____ _____ _____
Use the components shown in the circuit diagram circuit shown. Switch the circuit on. Do the following tests and record the results: a) Indicate if the LED is ON. (If Not - Correct your circuit) b) Measure the voltage drop across the LED only. c) Measure the voltage drop across the resistor.	 a) _____ b) _____ c) _____

Activity 28

Grade 10	Term: 4	Week No:	2	Class	
Topic: Systems and control:	Electricity - Lead Acid -Type Battery				
Learner:	• Complete work sheet below				

Question	**Answers/Explanation**
1. What does the cell of a simple battery consist of?	
2. What does a solution of electrolyte consist off and what should the specific gravity be of a fully charged battery?	
3. What is the purpose of the separator in the lead acid storage battery?	
4. How many cells does a 12 volt battery consist of?	
5. What type of safety apparel should you use when testing a lead acid storage battery?	
6. Why is it important to remove vent caps when charging a lead acid storage battery?	
7. What would happen to voltage and current When you connect two 12 V batteries in parallel?	
8. Why is it important to have a battery clamped down in a vehicle?	
9. What does a 90 amp-hour rating for a battery mean?	
10. Name any five electrical systems served by the battery in a vehicle.	