CHAPTER 1

THE NEED FOR CLASSROOM TRAINING AND DRIVERS ORIENTATION FOR BEGINNERS

In this topic, we shall be looking at the following objectives:

1) The art of driving
2) Meaning of learning
3) Types of learning
4) Meaning of a learner
5) Meaning of leaner's driver
6) Qualifications of a learner driver
7) The need for attending to classroom
8) Meaning of driver
9) Types of drivers
10) Meaning of driving
11) Types of driving
12) Basic skill in driving
13) Types of transmission
14) The vehicle controls
15) Moving and stopping of vehicle

INTRODUCTION

The art or profession of driving is one that cannot exclude the functions of driving school which include the inculcating of required driving knowledge and skills into drivers. These can go a long way in the country.

Over the years, Nigeria roads have been taking over by unlearn drivers, who engage in unwholesome driving practices that portend great hazards to other roads users. These negative practices have led to the destruction of valuable properties. In some cases, lives are lost.

THE ART OF DRIVING

The art of driving simply means ability of someone to learn all the necessary rudiment about driving. However, it is important for any to be driver to learn the habit of defensive driving which will protect him/her from any form of accident on the road.

MEANING OF LEARNING

Learning simply means acquisition of knowledge in order to perform new things. Learning takes place every day of our lives in as much as we are still living. The day someone stops learning such a person starts dying. Therefore, learning must be done with the aim of achieving a desirable behaviour which is acceptable in the society. The application of knowledge is called "Wisdom" so, wisdom is required for anyone that want to drive on the road, in other to safe his/her life.

TYPES OF LEARNING

There are types of learning:

1) Superficial learning
2) Indept learning
3) Over learning
4) Learning by imitation
5) Learning by dialogue between you and your driving instructor
6) Learning by assumption.

MEANING OF A LEANER

A learner is someone undergoing any form of training, in order to acquire knowledge in that area. A learner is under the supervision of an instructor. He/she takes directive from the instructor. Learning can be in any vocation such as, bead making, baking, tailoring, etc.

MEANING OF A LEANER'S DRIVER

A learner driver is someone that is learning how to drive a motor vehicle under the supervision of an instructor. In this instance, the learner mounts the steering from the very first day he/she registered in driving school. He/she is learning and at the same time driving which makes him/her a learner driver. A learner driver does not end in the driving school, it entails learning you do until you obtain your driving license. Driving with your personal car you must always know that you are still a beginner and learner which you require supervision or an instructor for you to be able to drive well, and at the same time obey the traffic laws.

Even though you may have received an excellent training at a driving school and have passed your test, you should still essentially regard yourself as a beginner for whom it will be necessary to acquire a great deal of practical experience, before you can consider yourself reasonably safe on the road.

QUALIFICATION OF LEARNER DRIVER

1) You must be eighteen years and above (18 – above)
2) You must be of a stable mind, that is not giving to alcohol
3) You must be sane not insane.
4) You must obtain a learner's permit from Government which enable you drive on the road.
5) You must attach sign 'L' both at front and back of your vehicle.
6) You must attend an approved driving school, where you obtain a certificate of competency and proficiency.
7) You must be guided by an instructor, failure to do this attract a fine from government.
8) A learner is not allowed to drive on the high way.
9) A learner must not be involve in speeding while learning on the road.
10) A learner is not encourage to drive at night, due to inadequate experience he/she has gathered.

THE NEED TO ATTEND CLASSROOM WHILE LEARNING

1) Driving requires classroom training as much as practical training.
2) Learning in the classroom replaces ignorance with knowledge.
3) Learning the theory in the classroom will enable the learner to acquire proper and complete knowledge in driving.
4) It is required by the law of FRSC that all learners must undergo classroom instruction.
5) It is in the classroom that learners are acquitted on basic driving skill, such as, vehicle checks, vehicle parade, vehicle mechanism and vehicle maintenance.

6) The classroom instruction enable the learner to ask question from or to the instructor.
7) Leaners are prepared for examination through teaching and learning in the classroom.

MEANING OF DRIVER

A driver is anyone that has undergone training on how to drive a motor vehicle. A driver is a person who manipulate a vehicle to enable it move from one point to another. He is someone who is above eighteen years and license to operate a motor vehicle for public and private purpose.

TYPES OF DRIVER

There are basically two types of driver on our roads:
1) Professional / Commercial
2) Non-Professional / Private

MEANING OF DRIVING

Driving simply means the art and act of moving a motor vehicle from one destination to another. The issue of driving requires special attention.
However is common for people to just get into a vehicle and drive without former training, thereby endangering not only their lives but the lives of others. The act of driving require good knowledge, good skill and good understanding of the risk on the road. This skill can only be acquired through a deliberate and well-structured program as its obtainable in the driving school. It therefore important skill needed for safe driving.

TYPES OF DRIVING

1) Offensive Driving – Driving done to commit an offense
2) Defensive Driving – Driving done to save life, time, properties.

ATTRIBUTE OF DEFENSIVE DRIVING

1) Concentration
2) Anticipation
3) Alertness
4) Good knowledge of traffic rules and regulation and road signs and marking.

BASIC SKILL IN DRIVING

1) Before opening the door of the vehicle, look under the vehicle to check if there is any leakage oil or water.
2) Check your tyres
3) Unlock the vehicle with keys or mobilize
4) Open the drivers' side door of the vehicle
5) Unlock the bonnet

6) Do the daily vehicle checking (radiator, water, oil pot, dash board, fuel, tyre and brake).
7) Enter the vehicle again m
8) Sit down on the driver's seat
9) Adjust the seat either forward or backward, and the three mirrors (inner and side mirrors) according to the driver's height and comfort. Adjusting the seat to a comfortable position will prevent cramps to the driver's limbs, which affects the ability to operate the pedals and steering easily.
10) Fasten the seat belts, even if the trip is intended to be a short one.
11) Switch on the ignition
12) Engage the gear
13) Release the handbrake
14) Gently release the left foot from the clutch as the right foot presses the accelerator pedal.

TYPES OF TRANSMISSION

Transmission simply means the movement of a vehicle, when all the parts are working together.

We have two types of transmission:

1) Manual Transmission
2) Automatic Transmission

THE VEHICLE CONTROL

MANUAL GEAR DRIVE

The manual gear box is operated with a clutch pedal.

1) Gear are changed to match the speed of the vehicle to the road conditions. The gear can only be changed from a lower to a higher gear sequentially i.e., from gear 1 – 2 – 3 – 4 – 5.

2) When stopping or slowing down, change from high to low gear. E.g. from 5 – 4 – 3 – 2 – 1.
3) When there is brake failure, use the gear to stop the vehicle, instead of pressing the brake pedal. Reduce speed gradually by using the gear (deceleration) e.g. from gear 5 – 4 – 3 – 2 – 1 and finally look for a safe place like a heap of sand and wedge the vehicle, to bring to a stop.

4) Avoid clashing the gears, by selecting the inappropriate higher gear, if the intention is to move faster, select a higher gear. Inadvertent selection of a lower gear would lead to the clashing of gear.

5) Gears can also be clashed when it is wrongly engaged without depressing the clutch pedal fully or engaging the gear by force.

6) Most vehicles are now fitted with five-speed gear box, plus the reverse, making it six, while some still have four-speed gear box. The fifth gear helps in reducing stress on the engine. The gear being engaged must therefore be related to the speed of the vehicle as follows:
   Gear 1 – 0 - 10km/ph.
   Gear 2 – 10 – 20km/ph.
   Gear 3 – 20 – 60km/ph.
   Gear 4 – 60 – 100km/ph.
   Gear 5 – 100km/ph and above.

7) Reverse gear is only used when you are moving backward.

AUTOMATIC GEAR DRIVE

Automatic gear box is operated without a clutch pedal and the gears would change automatically on their own.

The gear change automatically in relation to the speed and acceleration of the vehicle. There are usually three or four forward gears which the transmission itself selects according to the engine capacity.

The automatic transmission has the following features:

P – Park: For starting the engine and for stopping for an extended length the time and for parking.

N – Neutral: For starting the engine, disengages the engine from the drive wheels.

R – Reverse: For moving backwards. You must bring the vehicle to a complete stop before changing from a forward gear to reverse and vice versa.

D – Drive: For normal forward driving conditions. When the vehicle is in motion, the selector should remain in drive, but when the engine is on idle speed, the selector should be in neutral position with the hand brake for stop.

2 – 3 / 2 – 4: Lower gears for driving with heavy loads or through a rough terrain, or for climbing a hill.

2: For driving on slippery surface or up and down steep inclines.

1: For driving very slowly when off the highway.

1. First, evaluate the driving conditions on the interstate. Cruise control is not designed to be used in hazardous weather conditions. Use good judgment when deciding to apply your vehicle's cruise control. Check for any oncoming obstacles before applying cruise control, particularly if it is your first time to use the system

2. Build your speed. If driving on an interstate, the speed limit is generally between 70 -100 miles per hour. This speed range is ideal for cruise control. Do not attempt to set your vehicle's cruise control at a speed that is above the legal limit. This is both dangerous and unwise.

3. Once you reach your desired speed, turn the cruise control system on. In most vehicles, the buttons that control the cruise control system appears on the steering wheel. You should check your owner's manual and locate these buttons when the car is

4. After the cruise control system is activated, set the cruise control. This will likely entail simply pressing another button on the steering wheel. After the cruise control is set, you may remove your foot from the accelerator. The car should maintain its speed.

5. When driving a vehicle that is being accelerated by a cruise control system, it is important to watch the road carefully. Your reaction time will be slower because you will have to deactivate the cruise control system before you slow down or stop.

6. To accelerate while on cruise control, most models will either have additional buttons or allow the driver to briefly engage the accelerator pedal.

7. To decelerate, either tap the appropriate button on the cruise control system or quickly apply the brake. As a safety precaution, almost every model of car will deactivate the cruise control as soon as the brake is applied. Using cruise control is a great way to control your speed when driving on the interstate. Setting your vehicle's cruise control on a reasonable speed will also reduce fuel consumption by preventing sudden accelerations and decelerations. Be aware that it is not a good idea to use cruise control if you are likely to suffer from driver fatigue. Many drivers feel that being able to relax their legs while driving and not have to closely monitor their speed increases their likelihood of becoming fatigued at the wheel.

MOVING AND STOPPING OF VEHICLE

There are steps that must be adopted in moving and stopping of a vehicle. In manual transmission it involve the three pedals that is:

1) The Clutch
2) The Brake
3) Accelerator Pedal.

To move a manual carit is between clutch and accelerator while to stop the same is between clutch and brake.

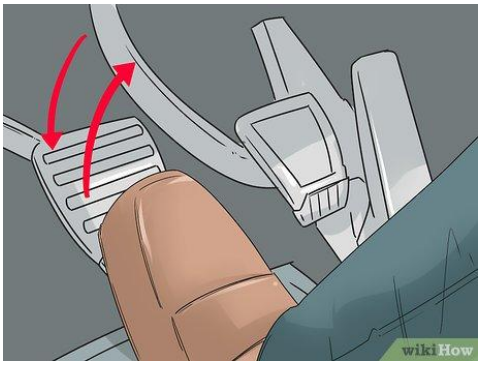
In an automatic transmission moving and stopping is between the brake and accelerator, because it has only two pedals. Details of it shall be done practically.

HOW TO DRIVE MANUAL

The basic concepts of starting and shifting through the gears is a manageable process for just about anyone. To drive a manual, you'll need to familiarize yourself with the clutch, become comfortable with the gearstick, and practice starting, stopping, and shifting gears at various driving speeds.

START ON LEVEL GROUND WITH THE CAR OFF.:-

Especially if this is your first time driving a car with a manual transmission, start slowly and methodically. Put your seat belt on once you sit down. While learning, it can be useful to roll down the windows. This helps you hear the sound of the engine revolving and to shift gears accordingly. The pedal on the left is the clutch, the middle one is the brake, and the accelerator is on the right (remember it, from left to right, as C-B-A). This layout is the same for both left-hand drive and right-hand drive vehicles.



LEARN WHAT THE CLUTCH DOES:- Before you start pushing down on this unfamiliar pedal on the left, take a moment to figure out the basics of its function. The clutch disengages the engine from the wheels. When one or both are spinning, the clutch allows you to switch gears without grinding the teeth of each separate gear.

Before you change gears (either to move up or down), the clutch must be depressed (pushed).

EXPERT TIP
When you're learning to drive a manual car, the most common mistake is that you take the clutch too fast and the car stalls out.

ADJUST THE SEAT POSITION SO YOU CAN ACCESS THE CLUTCH PEDAL'S FULL RANGE OF MOTION:- Slide forward enough to allow you to press the clutch pedal (the left pedal, next to the brake pedal) fully to the floor with your left foot.

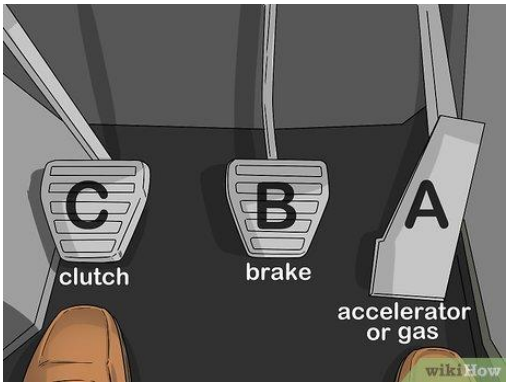
PRESS THE CLUTCH PEDAL AND HOLD IT TO THE FLOOR:- This would also be a good time to take note of how the travel of the clutch pedal differs from that of the brake and gas. It's also a good opportunity to get used to slowly and steadily releasing the clutch pedal.

If you've only ever driven automatic cars, it might feel awkward to use your left foot to push a pedal. With practice, you'll get used to using both feet in concert.

MOVE THE GEARSTICK INTO NEUTRAL:- This is the middle position that feels free when moved from side to side. The vehicle is considered out of gear when:

- The gearstick is in the neutral position, and/or
- The clutch pedal is fully depressed.
- Don’t try to use the gearstick without having the clutch pedal depressed, because it simply won't work.

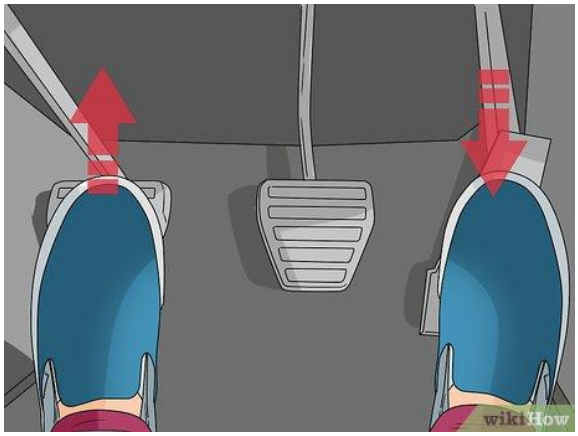
START THE ENGINE WITH THE KEY IN THE IGNITION, MAKING SURE THE GEAR STICK IS STILL IN NEUTRAL:- Make sure the handbrake is on before starting the car, especially if you are a novice.[6]
Some cars will start up in neutral without the clutch depressed, but some newer cars will not.



REMOVE YOUR FOOT FROM THE CLUTCH PEDAL WITH THE CAR STILL IN NEUTRAL:- If you’re on level ground, you should remain stationary; you’ll start rolling if you’re on a hill. If you’re ready to move on to actually driving, make sure to release the handbrake (if it’s engaged) before you drive off.

PRESS THE CLUTCH TO THE FLOOR AND MOVE THE GEARSTICK INTO FIRST GEAR:- It should be the upper-left position, and there should be some kind of visual layout of the gear pattern on top of the gearstick. Gear patterns can vary, so take some time beforehand to study your car's gear layout. You may want to practice shifting through the various gears with the engine switched off (and the clutch engaged).

SLOWLY LIFT YOUR FOOT UP FROM THE CLUTCH PEDAL:-Continue until you hear the engine speed begin to drop, then push it back in. Repeat this several times until you can instantly recognize the sound. This is the friction point. When you're shifting gears to start or keep moving, this is the point at which you'll want to have the accelerator depressed enough to provide power.



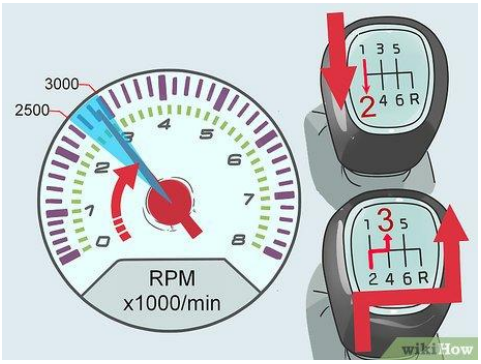
LET UP ON THE CLUTCH WHILE PUSHING DOWN ON THE ACCELERATOR:- In order to get moving, lift your left foot up from the clutch pedal until the RPMs drop slightly. At the same instant, apply light pressure to the accelerator with your right foot. Balance the light downward pressure on the accelerator with slowly releasing pressure on the clutch pedal.

You will probably have to do this several times to find the right combination of up and down pressure. Another way of doing it; is to release the clutch until the point the engine revs down a little, and then applying pressure on the accelerator as the clutch engages. At this point the car will start to move.

It is best to have the engine rev just enough to prevent stalling as the clutch pedal is let up. This process may be a little difficult at first because you are new to the extra pedal in a manual car. Release the clutch fully (that is, slowly remove your foot from the pedal) once you start moving forward under control in first gear.

EXPECT TO STALL AT LEAST A FEW TIMES WHEN YOU'RE FIRST STARTING OUT. IF YOU RELEASE THE CLUTCH TOO QUICKLY THE ENGINE WILL STALL:-.

If the engine sounds like it is going to stall, hold the clutch where it is or push down a bit further. If you do stall, depress the clutch fully, apply the handbrake, put the car in neutral, switch the engine off and restart the car as normal. Don't panic. Revving the engine while the clutch is between fully up and fully depressed will wear out the clutch parts prematurely, resulting in slippage or smoking of the clutch parts at the transmission. This is called riding the clutch and should be avoided.



RECOGNIZE WHEN IT'S TIME TO SHIFT UP TO A HIGHER GEAR:- When your RPM reaches about 2500 to 3000 while the car is in motion, it is time to shift to the next gear — for example, second gear if you are currently in first. The actual RPMs at which shifting is required will vary by the car you are driving, however. Your engine will begin to race and speed up, and you must learn to recognize this noise. Depress the clutch pedal until it disengages and guide the gearstick straight down from first gear into the bottom-left position (which is second gear in most configurations).Some cars have a "Shift Light" or indications on the

tachometer that will tell you when you need to shift, so you don't rev the engine too fast.

PUSH DOWN ON THE ACCELERATOR VERY SLIGHTLY AND SLOWLY RELEASE THE CLUTCH PEDAL:- Shifting gears in motion is the same as shifting into first from a stationary position. It's all about listening, looking, and feeling for the engine's cues and getting the up-and-down timing of your feet on the pedals correct. Keep practicing and you'll get the hang of it.

Once in gear and on the accelerator, you should completely remove your foot from the clutch pedal. Resting your foot on the clutch pedal is a bad habit, as it applies pressure to the clutch mechanism — and the increased pressure will cause the clutch to wear out prematurely.

SHIFT DOWN INTO A LOWER GEAR AS YOU SLOW DOWN:- If you are going too slow for the current gear you're in, your car will shudder as if it's about to stall. To shift down gears while in motion, follow the same process of depressing the clutch and releasing the accelerator, shifting gears (say, from third to second), and letting off the clutch while depressing the accelerator.

COME TO A COMPLETE STOP:- To come to a stop in a fully controlled manner, shift down gradually until you reach first gear. When it's time to come to a complete stop, move your right foot from the accelerator to the brake pedal and press down as much as is required. As you slow to about 10 mph (16 km/h), the car will be on the verge of shaking and vibrating. Press the clutch pedal fully down and move the gearstick into neutral to prevent stalling the car. Use the brake pedal to stop completely. You can also stop while in any gear by depressing the clutch fully and using the brake while shifting into neutral. This should only be done when you need to stop quickly, though, as it puts you in less control of the vehicle.

PRACTICE ON AN EASY COURSE WITH AN EXPERIENCED MANUAL DRIVER:- While you can legally practice alone on any public road with a valid driver's license, you will pick up the nuances of driving a manual car faster if you have an experienced driver accompanying you. Start off in a flat, isolated area like a large (and empty) car park, then move on to quiet suburban streets. Drive around the same circuit repeatedly until you start to remember the various skills involved

AVOID STOPPING AND STARTING ON STEEP HILLS INITIALLY:-When you're new to driving a manual, plan routes that avoid traffic lights at the top of steep hills. Your timing and coordination in working the gear stick, clutch, brake, and accelerator needs to be fairly sharp in order to avoid drifting backwards when you shift into first gear. You need to be able to quickly (but smoothly) move your right foot from releasing the brake to depressing the accelerator, while at the same time letting out the clutch. You can use the parking brake to limit

backward drifting if necessary, but always remember to disengage it as you start moving forward.

LEARN PARKING PROCEDURES, ESPECIALLY ON HILLS:- Unlike automatics, manual transmission cars don't have a "park" gear. But, simply putting the car in neutral opens the possibility of your car rolling freely, especially if parked on an incline or decline. Always use the handbrake, but don't rely on it alone to keep your car in place whilst parked.

- If you are parked facing uphill, shut the car off in neutral, then shift into first gear and apply the parking brake. If facing downhill, do the same but shift into reverse. This will prevent the wheels from rolling in the direction of the slope.
- On extreme inclines, or simply to be extra cautious, you can also place chocks (angled blocks) behind your wheels to prevent movement.

STOP COMPLETELY BEFORE CHANGING FROM FORWARD TO REVERSE (AND VICE VERSA:- Making a complete stop when changing directions is an easy way to reduce your likelihood of causing expensive damage to your gear box. It is strongly recommended to stop completely before going from reverse to first gear. However, it is possible on most manual transmissions to shift into

first or possibly second when the car is moving backwards at a slow speed, but it is not recommended as this can cause excessive wear on the clutch.

In some cars, reverse gear has a lock out mechanism to prevent you for engaging it accidentally. Before using the reverse gear, make sure you know about this locking mechanism and how to disengage it before selecting reverse.

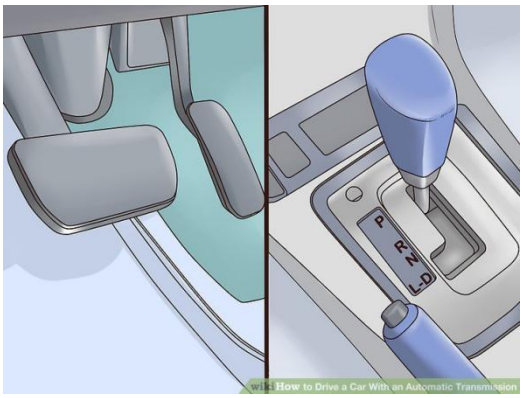
HOW TO DRIVE A CAR WITH AN AUTOMATIC TRANSMISSION

Cars with automatic transmissions are very popular for both new and experienced drivers, as they are generally simpler to operate than manual transmissions and can be more comfortable for long trips. These simple steps will guide you in learning to operate an automatic transmission, but remember: before operating any motor vehicle, please make sure you have a valid driver's license and understand all local traffic laws.

PREPARING TO DRIVE

Get into your car. Unlock the vehicle with a clicker or key and climb into the driver's side.

Adjust the car to your needs. Adjust your seat in any direction you are able to/find necessary so that you can comfortably reach any controls and see well out of windows. Move the mirrors so you can see behind and to the sides of the vehicle clearly. Identify the car's blind spots before you start driving so that you can check them before making any turns or lane changes.



Identify the controls. It essential to find the accelerator and brake pedals, the steering wheel, the gear selector lever, the light controls, the defroster, and the windshield wipers before you begin.

The brake and accelerator pedals are located at the bottom front of the area where your feet are. The brake pedal is on the left, the accelerator is on the right.

The steering wheel is the large wheel in the center of the driver's console. Turn it to the left and right to turn the wheels of the vehicle.

Located on the steering column (usually on the left side) is a small lever that has a rest position in the middle and two locking positions above and below. This is the turn signal. Often on the left side of the steering wheel mounted into the console or a knob on one of the levers on the steering column is the control which turns the headlights on and off.

The gear selector lever will usually be in one of two places: it is either mounted to the right side of the steering column or in-between the driver's and passenger's seats. It will have a display showing gear indicators, usually marked with the letters "P", "R", "N", and "D" and a few numbers. On steering-column shifting levers, this display is usually located on the instrument panel, underneath the speedometer.

Fasten your seat belt. Ensure that you and any passengers in your vehicle are wearing seat belts at all times.

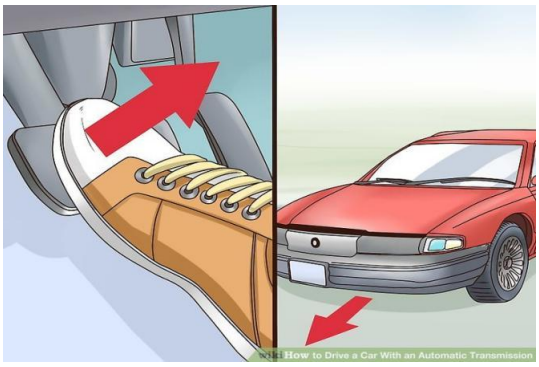
PART 2
Operating the Vehicle in "Drive"

Start the car. Place your right foot on the brake pedal and push it down, then insert the key and turn it clockwise to start the vehicle.

Select your gear. Keep your foot on the brake pedal and shift the gear lever into "Drive." This gear is marked with a "D" on the display panel, and will be highlighted when you've successfully selected it.[3]
For shift levers mounted on the steering column, pull the lever towards you before moving it up and down to select a gear.
For shift levers mounted on the floor, there is usually a side button to unlock the lever. It can then be moved along its track into position.

Release the parking brake. This is either a lever between the two front seats or a pedal on the far left side of the foot area. There may be a release lever above the lower parking brake or a button to push on the topside model before you can disengage it.

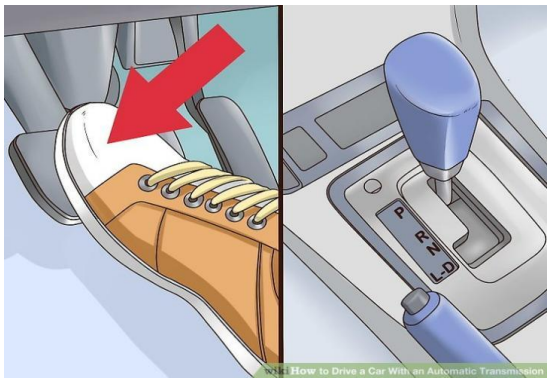
Check your surroundings. Look all around the car, including blind spots, to see if there are any moving objects or beings in the vicinity. Make sure to keep your eyes mainly on the direction you're moving.



Get your car moving. Slowly release pressure on the brake pedal and the car will start to move slowly. Take your foot off the brake, use the same foot to press the gas pedal gently, and the car will begin to move faster. There is no need to change gears in relation to speed in regular road driving.

Turn the steering wheel to turn the car. In "drive," turn it to the left to turn the car left and turn it to the right to turn the car right.

Apply the brakes to slow or stop the car. Take your right foot off the accelerator pedal and move it to the brake, applying gradual pressure so as not to jerk to a halt. When you wish to start again, switch your foot back to the accelerator.

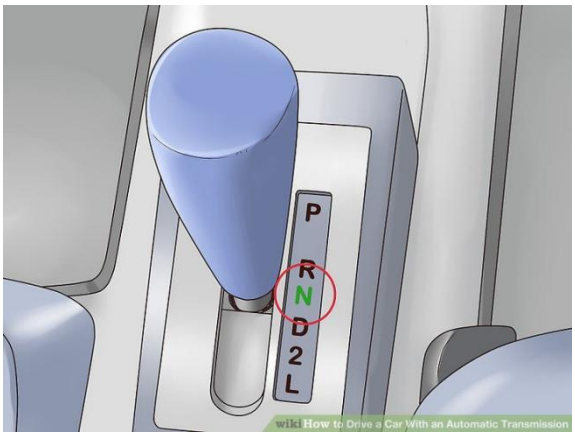


Park the car. When you have reached your destination, bring the vehicle to a complete stop by applying gradual pressure to the brake pedal and slide the shift lever back into the "P" position. Turn off the engine by turning the key counter-clockwise. Don't forget to turn off the headlights and apply the parking brake before getting out of the car.

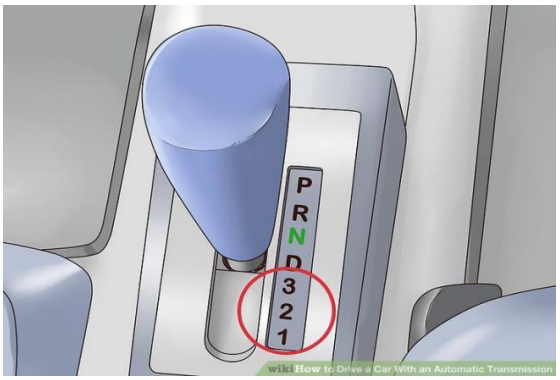
PART 3
Operating Alternative Gears

Travel in Reverse. If you need to travel backward, make sure the vehicle is at a complete stop before changing gears in or out of "reverse." Slide the gear shift to select the gear marked "R" and check behind/ around you for any possible obstructions. Gently remove your foot from the brake and place it on the accelerator.

When turning in Reverse, your car will turn in the same direction that you turn the wheel. You're just going backwards, so the end of the car will swing in that direction, rather than the front.



Use "neutral." The "neutral" gear is only to be used when you have no need to control the speed of your car, not when driving regularly. Examples of this include when idling parked for a short time or when being pushed/towed.



Use the lower gears. The gears marked "1,""2," and "3" are known as lower gears. These can work as a sort of in-engine brake system when you need to save your actual brakes. Going down steep hills is a good use of this technique. 1st gear, however, is only to be used when you must go very slowly. There is no need to stop when shifting between these gears and Drive.

CHAPTER 2

YOU AND THE ROAD

In this topic, we shall be looking at the following objectives:

1) Meaning of Driver
2) Responsibilities of Driver
3) Introduction to the Road
4) Beginning on the Road
5) Meaning of Road
6) Types of Road
7) Meaning of Junction
8) Types of Junction
9) Meaning of Roundabout
10) Uses of Roundabout
11) Rules of using the Junction
12) Concept of Right of way
13) Categories of people using the road
14) Sharing road with others
15) Meaning of Road signs
16) Road Signs
17) Road Marking
18) Sitting position on a car
19) Safe Driving Tips

MEANING OF DRIVER

A driver is a person who manipulates a vehicle to enable it move from one point to another.

He is someone who is above 18 ye ars and licensed to operate a motor vehicle for public/private purposes.

RESPONSIBILITIES OF DRIVER

The driver, who operates, control, and direct the course of a vehicle has several responsibilities which refers to his character as well as his work:

a) He must be able to do routine vehicle checks and basic maintenance.
b) Road safety consciousness
c) Must be able to report Road Traffic Crash (RTC)
d) Journey records: keep records of journey
e) Must observe Defensive driving techniques always
f) Neat and neatly dressed
g) Cost and Time Consciousness
h) Able to communicate effectively
i) Must have basic knowledge of auto mechanics.

INTRODUCTION TO THE ROAD

To drive on Nigerian roads, you must be:

- 18 years and above
- A holder of a valid national drivers licence issued by the Federal Road Safety Commission
- Having a vehicle that is road worthy
- In possession of valid vehicle papers
- Of sane mind and sound body.

Every vehicle on Nigerian roads is to keep to the far right side of the road. All overtaking is to be done from the left side of the road. Steering wheels of ALL vehicles on Nigerian roads must be fitted at the left side, the vehicle. The use of right-hand drives was prohibited in Nigeria in 1973; you are to hold the steering wheel at 15 – 3 for safety.

The class of driver's licence you are holding would determine the kind of vehicle you are also allowed to drive. Make sure that your driver's licence class is the one allowed by law for the kind of vehicle you are driving.

BEGINNING ON THE ROAD

- Switch on the ignition, ensuring that the three turnings of the ignition key is properly carried out for a good output i.e. Radio, the dashboard and the engine are properly turned on.
- Watch the dashboard warning lights for oil pressure, battery charging, hand brakes, temperature, fuel gauge etc as they give information of the status of these systems.
- Before starting up, make sure the doors are locked.
- Adjust the driver's seat as you sit, to a comfortable position that would enhances clear vision and effective control.
- There should be enough space to allow your legs move freely to operate all the pedals without moving your back away from the seat, and the hands when fully stretched, should be able to touch all the controls on the dashboard.
- The distance between the centre of the steering and the driver's chest should between 10 and 12 inches.
- Strap on the seat belt.
- Check to see that handbrake is drawn, as this will prevent the vehicle from moving thus enabling the driver to start his engine and carry out all his checking before moving off.
- Ensure that the gear is in neutral position
- Adjust the mirrors, both the inner and two outside mirrors, to enhance your vision of traffic activity behind.
- Accelerate smoothly by pressing your left foot on the clutch pedal, select your gear, release the handbrake, gradually release the foot from the clutch pedal and at the same time, gently and slowly press down the accelerator pedal with the right leg.
- Moving off. Take note, this is on manual cars.

MEANING OF ROAD

A road is a path established over land for the passage of vehicles, people and animals. It provides dependable pathway for moving people and goods from one place to another.

Roads are typically smooth, paved, or otherwise, prepared to allow easy travel. Historically, many roads were simply traditional or local routes without any formal construction or maintenance.

TYPES OF ROAD:

Roads may be classified as:

- Private Drive Pathways

- Two-lane Highways

- Dual Carriageways

- Expressway

Private Drive Pathways
These are roads-owned, maintained or controlled by an individual, agency or organization.

Two-Lane Highway
These are the usual single carriageways. Traffic on two-lane highways normally flow in opposite direction on single lane. Two-lane highways may be rural, urban, intra or intercity roads.

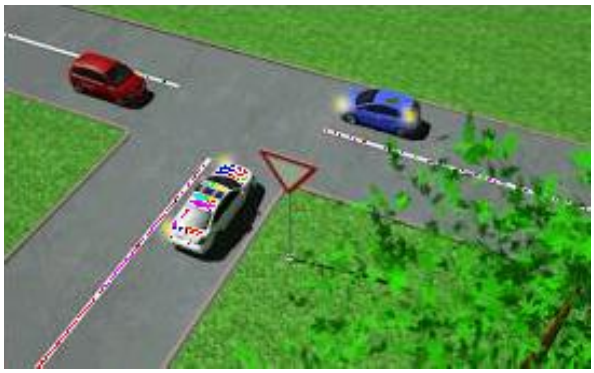
Dual Carriageway
This is a road which has multiple lanes with traffic going in opposite direction. They may or may not be physically separated, on passable dividers such as concrete barrier.

Expressway
This is a specially designed and restricted highway divided with barriers which make traffic in opposite directions completely separated from each other.

MEANING OF JUNCTION
As you drive on the road you meet junction. Therefore a Junction is the place where two or more roads meet.

<u>Types of Junction</u>

(A) **T-Junction**
This is a place where two roads meet in the shape of letter T.



(B) **Y-Junction**
This is a place where two roads meet in the form of letter Y.

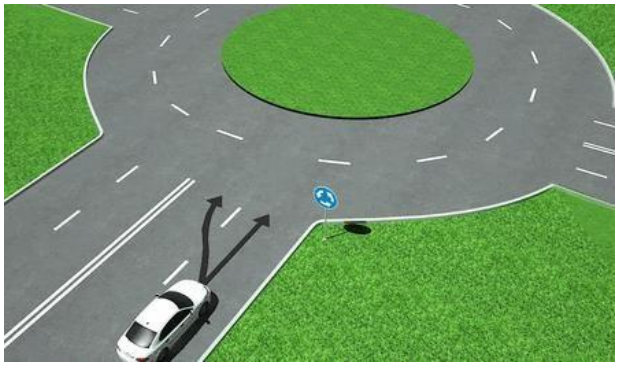
(C) **Cross Road**

A cross road is the place where two roads meet and cross each other. It could be in form of:

- A major road crossing a minor road or
- Two equal roads crossing each other

(D) **Round-about**

A place where two or more roads meet, forming a circle that ensures that all traffic must go around in the same direction.



RULES OF USING THE JUNCTION

1) Slow down whenever you approach a junction
2) Bring to a lower gear in manual car especially two or one
3) Watch out for the traffic already on the junction
4) Indicate your intension to other drivers
5) Look right and left before making any man over.
6) Use your horn to warn or alert the traffic and pedestrians on the junction
7) Do not pack on a junction, so as not to obstruct traffic flow.

USES OF ROUNDABOUT

When approaching a roundabout:

- Watch out for traffic already it.
- Take special care to look out for cyclist or motorcyclist ahead or to the side.

- Give way to traffic on your left unless marking indicates otherwise. Keep moving if the way is clear.

When turning right

- Approach on the right-hand lane; keep to that lane in the roundabout and leave by the lane. Use the right turn indicator on approach and through the roundabout.

When going straight

- Approach on the right-hand lane; keep on that lane in the roundabout. Use the turn indicator **at the exit before the one to be taken. If** conditions dictate (for example, if the right lane is blocked) approach in the left hand lane, keep to that lane in the roundabout.
- You must signal your intention here to turn right. Enter with the left signal on.

When turning left

Approach in the left hand lane, use the left turn indicator before entering the roundabout and maintain this signal while keeping to the left-hand lane. On approaching a round-about, maintain it until you leave the roundabout.

When making U-turn

- Enter with left signal on and keep going
- Before exit, change the signal to right.

Leaving the roundabout

When going forward or turning left, always leave the roundabout in the left-hand lane of the exit road, unless conditions dictate the use of right-hand lane.

Mind Other Vehicle

When in a roundabout, look out for vehicles crossing in front of you to leave by the next exit.

CONCEPT OF RIGHT OF WAY

Meaning: A vehicle has a right of way when it is expected to go while others must wait. GIVE WAY is denoted by an inverted triangle road sign, also known as YIELD.

- On an ordinary two-lane road, give way to vehicles coming towards you before you overtake parked vehicles or other obstructions on your right side of the road.
- Drivers approaching obstacles such as road work, potholes, garbage mounds or other impediments may not be able determine which of them should give way to the other. The general rule is that the vehicle that is further from the stationary object should slow down or stop, to allow the nearer vehicle to go first.

- At roundabout, give way to vehicles coming from the left.
- At junctions where major roads intersect with minor roads, the vehicles on minor roads would give way to those at the major roads.
- At crossing or junctions of equal dimensions, the general rule is that NO ONE has safety, the one farther from the junction should yield right of way to the one nearest to the junction.

CATEGORIES OF PEOPLE USING THE ROAD

- The Motorist
- The Pedestrian
- The Cyclist
- The Motorcyclist
- The Child
- Animals
- The Hawkers
- The Traders

SHARING ROAD WITH OTHER

The road does not belong to you alone. The road is a mix for truckers, cars, trailers, mopeds, Tricycles, bicycles, and pedestrians etc.

We must show consideration to other road users. Lack of consideration for other road users have often resulted into accidents you must stop and think about the sorrow which accidents have brought to widows, widowers, and children. Think of the loss of our cherished property. Think of the agony of an amputee whose remaining years on earth will be a crutches or wheelchair. The more we think about all these avoidable losses, the more we should decide to be more responsible in sharing the road. Sharing the road is a very important quality of a wise driver who is a student of Road code. How do we share the road?

The road as we know is made up of tracks for the movement for various road users, our own action must not stop other road users from carrying out their own lawful actions.

SHARING WITH HEAVY DUTY VEHICLES (ARTICULATED VEHICLES)

Articulated and heavy duty vehicles need more space to turn at intersections. Make sure you do not block their space for turning at intersections by stopping your vehicle before the STOP LINE.

- Drivers of heavy duty vehicles are also urged to show due consideration for smaller vehicles, motorcycles and pedal cycles. It is a common practice to see heavy duty vehicles' drivers bully other smaller car drivers out of the road.
- When stopping at intersections, do not park too closely behind heavier vehicles as they may roll back before moving.
- At intersections with hills or slope, avoid staying in front of heavy vehicles closely in a parked position as they may roll.
- The parking distance you keep in front of them (heavy) vehicles on a wet road should increase.
- When you approach the areas where so many articulated vehicles are parked, watch out for diesel spillage which make the road slippery.
- Also watch out for pebbles and stones that may fall out from trailers and trucks carrying chippings and stones.
- Avoid the temptation of overtaking these heavy vehicles at the slope of a hill, rather increase your following distance and use your head lamp if their exhaust pipes emit dark smoke. Also use head lamps at construction sites where the activities of tippers on the dusty road may make your vehicle invisible.
- Make sure you can see the surface of the road in front of a trailer you wish to overtake before final overtaking as pot holes or broken down vehicles in front of the trailer driver may force him to move left wards on the overtaking stretch of the road.
- On single carriageways, make sure your vehicle is in good condition before overtaking heavier vehicles because difficulty in picking up steam makes the drivers less willing to slow down on the highway.
- At interchanges, excise greater caution if you notice an articulated vehicle already on the expressway.
- At night, brig your head lamp to the low beam on approaching a heavy duty vehicle as your dazing full beam head lamps may 'blind' the driver and cause an accident.

SHARING WITH PEDESTRIANS

Pedestrians (people walking the road) also have a right to the use of the road. Road construction is expected to make provision for pedestrians and even physically challenged persons using wheelchairs through the provision of walkways which would be demarcated from the area used by motorists. However in roads that do not have walkways you also need to look out for pedestrians who have no choice other than to share the road with motorists.

At built up areas, the highest speed allowed by law on Nigerian roads is 50k/h. Also realize that at zebra crossings, the pedestrian has right of way once he or she has stepped into the zebra marking before your vehicle got to the zebra. At road junctions, markets, schools, churches, mosques, cinemas, hospitals, watch out of pedestrians trying to cross the road, slow down as most of them may not be fast enough to cross in good time especially women, children, the elderly and the physically challenged.

Do not overtake a vehicle while approaching a zebra crossing. When stopped at intersection controlled by traffic lights, allow the pedestrian who is already on the zebra crossing to finish crossing before you proceed even when the green light is on. At road junctions, use your horn to warn pedestrians backing you before you turn off. In the early hours of the morning, look out for sportsmen jogging on the road and lunatics. Their clothing's may not be reflective enough. Show greater care at parts of the road where a long stretch of vehicles are "double parked", pedestrians may hop out of the stretch and you may have less time to avoid running into them.

Pedestrians are however advised to observe the crossing traffic drill (stop, look left, look right, look left again, cross quickly if the road is clear, do not run).

Pedestrians are also advised to walk the road at night with light-coloured clothes. Where there are no walkways, walk on the left hand side of the road so as to face on-coming traffic.

SHARING WITH EMERGENCY VEHICLES

Emergency vehicles as the name suggests are used during emergency situations to move facilities evacuate victims or rescue people during disasters. Due to the function of emergency vehicles, they require free and easy access so as to move as quickly as possible. Police patrol cars, fire trucks, ambulances and escort cars in the pool of government houses are example of emergency vehicles. These vehicles are specially fitted with flashed lights (flashers) and high resonant horns (sirens) which give them right of way when used. You are urged to give way to them so as to enable them carry out their emergency duties. When you approach emergency vehicles, do not leave the road in a manner that would cause accident; rather observe the location, move out in an orderly manner with your turn signal light showing the direction of your movement.

When you move out of the road, wait for a while in order to give good distance to emergency vehicle to move away. Do not follow these vehicle closely.

SHARING WITH TRAINS

There are portions of the road where we share the road with trains. They are known as level crossing. At level crossings, make sure there is no train coming before you cross. If you meet a hold up or queue by a level crossing ensure you do not drive “Nose to tail” to cover the crossing. Looking out for flashing red warning lights, alarms gates, or signalman with red flag. Note that you stand no chance of survival in the event of a collision with a moving train, no matter the size of your vehicle.

SHARING WITH ANIMALS

Although and animals should not share the road with motorists, in Nigeria we notice that herdsmen bring their cows to the road especially when there is not other access road to use in getting to their locations. The cows are herded on the fringes of the road but occasionally they move into the road. There is need for you to be very patient when you notice animals on the road and you obviously have to share the road with them. Slow down and take the free side of the road. Refrain from continuous blaring of your horn or revolving your engines as this may frighten them and make them become frantic and disorderly. You may tap your horn once enable the herdsmen notice you. Al night, switch off your head lamps if you are facing the flock and use hazard lights as your dazzling head lamps may make them bump into you. It should also be noted that animals are used a means of transportation of persons/goods in some parts of Nigeria. If you approach them, slow down and observe the movement of the Horse or donkey so as to overtake safely.

MEANING OF ROAD SIGNS

Most countries post signage's at the side of roads to convey information to road users.

The earliest road signs were milestones, giving distance or direction (they still exist till date).

Traffic signs become more important with the development of automobiles. The basic patterns of most traffic signs were set at the 1908 International Road Congress in Rome.

Today, signs are almost all metal rather than wood and are coated with retro-reflective sheeting of various types for night-time and low-light visibility.

New generations of traffic signs based on big electronic displays can also change their symbols and provide intelligent message by means of sensors or by remote control-some cities in Nigeria already have them!

CATEGORIES OF ROAD SIGNS

- Warning Signs
- Regulatory signs (Prohibitory)
- Regulatory signs (Mandatory)
- Informative signs – Facilities or Service
- Special regulation – Construction zone
- Traffic Lights

Driving, road emergency and security issues require mental skills which requires your ability to recognize and obey a particular road sign.

Nigeria road signs and symbols you must know; about the common road signs in Nigeria and be able to recognize them immediately. In the case of road signs, signals and markings, you must obey them without hesitation. Traffic signs tell you about traffic regulations, special hazards and other road conditions, construction areas speed limits, etc. You should not only be familiar with each of the signs, you should recognize the special shapes and colours. Regulatory Signs they are mostly circular in shape and are of two types. Those with red and yellow circles are prohibitive signs. Those with blue circles but no red border are mandatory signs. They give positive instructions and are regulatory signs.

ALL ROAD SIGNS

Features of warning signs

1. They are triangle in shape
2. They have yellow background
3. They have red boarders
4. They have black inscription/or pictures.

Regulatory Signs they are mostly circular in shape and are of two types. Those with red and yellow circles are prohibitive signs. Those with blue circles but no red border are mandatory signs. They give positive instructions and are regulatory signs.

Features of regulatory signs {mandatory}

1. They are circular in shape
2. They have blue background
3. They have white inscription
4. They have white borders.
5. They show positive direction on what the driver should do

Features of regulatory signs {prohibitive}

1. They are circular in shape
2. They have red background
3. They have white boarders
4. They have bar across the circle
5. They show what the driver should not do

Features of informative signs

1. They give information on the current situation on the road
2. They are square/rectangle in shape
3. They have green background
4. They have white inscription

MIXTURE OF ROAD SIGNS

WARNING SIGNS

REGULATORY SIGNS (MANDATORY) DIRECTION TO BE FOLLOWED

ROAD MARKINGS

Lines and marks on the road are also meant to give directions and instructions to drivers. Markings also indicate lanes where overtaking can be done or prohibited.

There are four major types of markings:

- Centre Lines
- Cross Lines
- Edge Lines
- Pavement Message

There are many forms of road markings and lines. Road markings and road lines can be found along the road or across the road to provide awareness and to give drivers rules or directions.

A large part of the theory test is based on road markings and lines knowledge and of course this knowledge is also essential when learning to drive and taking the driving test.

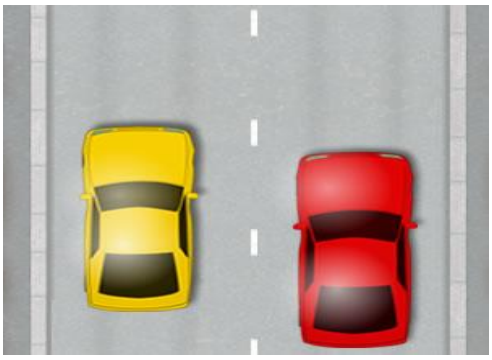
The following are samples of road marking

(1)

CENTRE BROKEN WHITE LINE

Centre broken white line on a single carriageway road. This line is used to provide a visual divide between both carriageways traveling in opposing directions. Many roads use this dividing line although certain roads such as quiet residential back-roads or some rural roads and lanes may have no markings at all.

(2)



LANE LINE

Lane line found on single or dual carriageway roads separating traffic travelling in the same direction. As can be seen in the image, the white dashes on lane lines are smaller with much larger gaps than a normal centre line that can be seen in the image above.

(3)

GIVE WAY ROAD MARKINGS

The upside down triangle road marking found just before a junction represents the triangle give way sign. The triangle road marking is used to provide an extra visual aid warning drivers of a junction just ahead. this road marking may not be used on roads where there is relatively little traffic. Give way road markings are also represented by one or two broken white lines across the carriageway.

(4)

STOP LINES AND ROAD MARKINGS

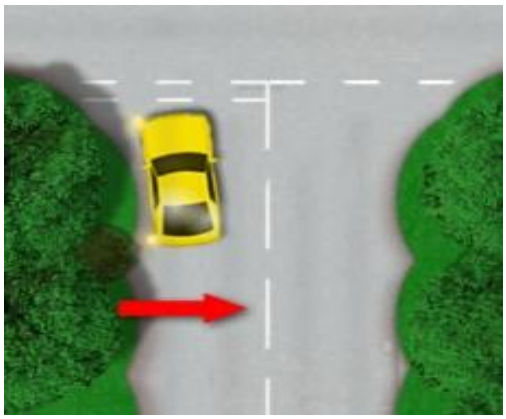
Unlike the dashed give way lines, stop lines at junctions are wide and solid and are usually accompanied by the word 'STOP' written on the road surface just before the line and also a stop sign. By law you must stop at a stop line regardless of whether the road appears clear and safe to proceed without the need to stop.

(5)

STOP LINE AT TRAFFIC LIGHTS

Solid white stop lines are also located at traffic lights. The stop line although similar to that found at junctions as above, is not as wide.

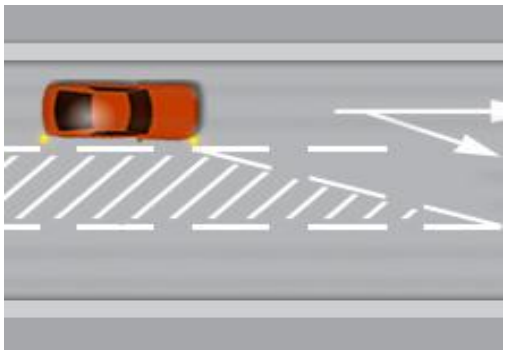
(6)



HAZARD WARNING LINE

Hazard warning lines are used to mark hazards ahead such as a bend in the road or an approach to a junction. As can be seen in the image to the left, the white lines are much longer than usual with small gaps between. Hazard warning lines replace a centre line or lane line. Signs may also be used to indicate the nature of the hazard.

(7)



HATCHED ROAD MARKINGS

Hatched road markings or diagonal white lines are surrounded by either continuous solid white lines or broken lines. Hatched road markings are often used to separate opposing flows of traffic.

(8)

DIVIDING CHEVRON MARKINGS

Part of the carriageway where traffic travels in the same direction on either side of the chevron marking. Vehicles should not enter the chevron area unless safe to do so. This marking is likely to be found in one-way streets with central islands and where an exit lane leaves at a junction.

(9)

CHEVRON ROAD MARKINGS WITH SOLID LINE

Chevron road markings with a solid white line forming a continuous boundary prohibit traffic from entering are used in such areas as dual carriageway and motorway slip-roads. It is also used for segregated left-turn lanes at roundabouts.

(10)

LANE REDUCTION HATCHED ROAD MARKINGS

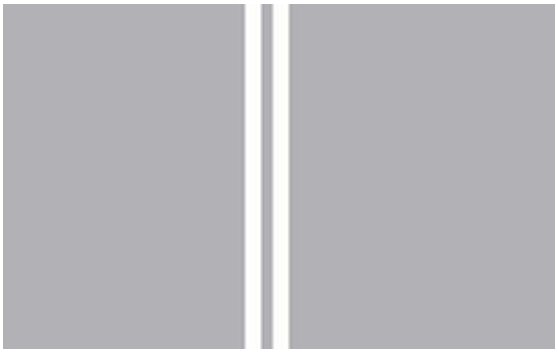
These hatched road markings are used for a reduction in lanes. The solid white line forms a continuous boundary prohibiting vehicles from entering except on an emergency.

(11)

DIRECTIONAL ARROW MARKING

Arrow indicating the direction in which to pass hatched markings and double white lines, or the route that high vehicles should take under a low arch bridge(may be reversed).

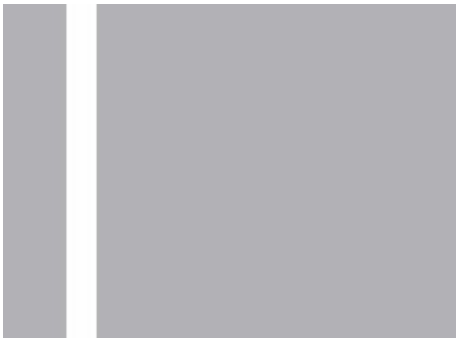
(12)



DOUBLE WHITE LINES

Double white line road markings must not be straddled or crossed except to turn into or out of a side road or property, avoid a stationary vehicle blocking the lane you are traveling in, or overtake a cyclist, horse or road works vehicle moving at not more than 10 mph.

(13)

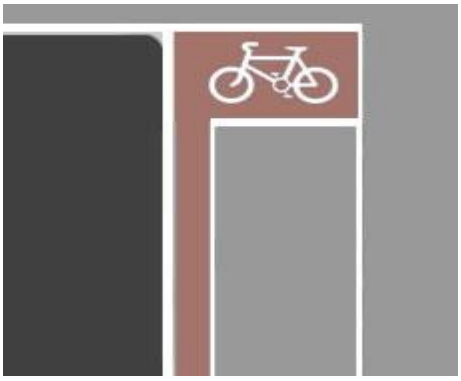


SINGLE WHITE LINE ROADSIDE

Single white line at the edge of the carriageway, other than at junctions, a single white line exits on private drives and lay-bys. Used on the left-hand side of the

road and alongside the central reservation of dual carriageway roads. See single white line for other types of white lines found at the edge of the road, where they are found and any parking restrictions that may be imposed.

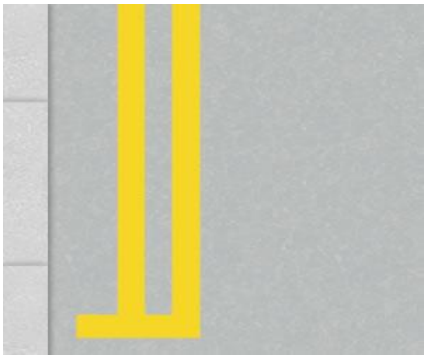
(14)



CYCLE LANES AND BOXES

Cycle lanes and cyclist boxes are designed to keep a safe distance between motorists and cyclists. The cycle lanes section offers a guide to all motorists to the meaning of road markings surrounding cycle lanes and how to correctly deal with cycle boxes.

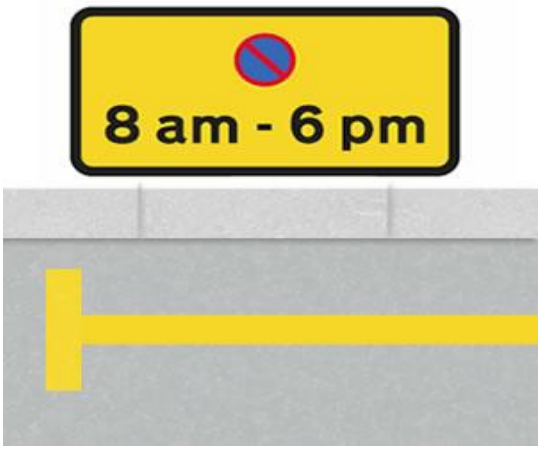
(15)



DOUBLE YELLOW LINES

Double yellow lines generally means no waiting at any time. There are various sign, marking and exceptions that do allow motorists to wait on double yellow lines for a short period of time. The double yellow lines sections explains what the various signs and markings mean, plus who is legally permitted to wait on double yellow lines.

(16)



SINGLE YELLOW LINE

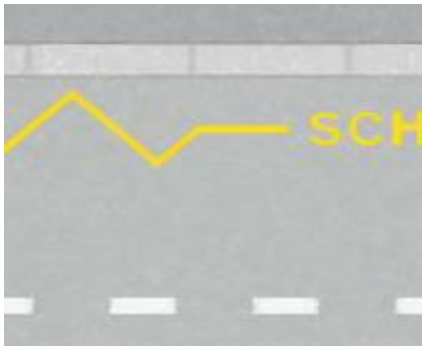
Single yellow line road markings are put in place to inform motorists that part-time parking restrictions are in force. Restrictions are based either on a certain road or within a controlled parking zone. The single yellow line section explains who can park, under what circumstances and when.

(17)

RED ROUTES

Red routes are red single and double lines that enforce stopping, loading and parking restrictions. Red route double red lines laws are rigorously enforced by local police traffic wardens, the council's own parking attendants or by CCTV and motorists that do not abide by the rules receive high fines. Red routes are located in cities usually on high traffic density arterial carriageways.

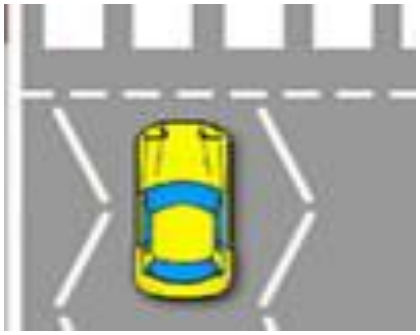
(18)



YELLOW ZIGZAG LINES

Yellow zigzag line road markings are located outside of schools, hospitals, police and fire stations. Although there are certain circumstances zigzag road markings can be parked on, this section explains when you can and can't park on the zigzags.

(19)



ZIGZAG ROAD LINES

Zigzag road lines in the UK are either white or yellow. Although they are placed to inform motorists of similar rules, white zigzag lines are placed in different locations to yellow and can be enforced by different authorities resulting in varying penalties and fines. See zigzig road lines for further information on the various penalties, who enforces them and what the typical fine charge is.

(20)

KEEP CLEAR ROAD MARKINGS

Keep clear road markings are used to improve traffic flow and to reduce congestion. Read more about Keep clear road markings, any law that applies to them and how they can affect a driving test.

(21)

ROAD TRAFFIC LANE MARKINGS

Road lane markings are placed to inform drivers of the appropriate lane needed for a destination. The road lanes tutorials offers advice on what the markings mean, the changing lanes guide provides advice for safely changing lanes. Also available is lane discipline advice and road positioning.

(22)

BUS LANE ROAD MARKINGS

Bus lane road markings are used to inform drivers when they may turn into a bus lane or when they should be avoided. Many motorists are fined each year due to entering bus lanes when it is prohibited. The bus lane road markings section helps those taking the theory test.

(23)

BOX JUNCTIONS

Yellow criss-cross lines painted on the road signify that there is a box junction. The yellow criss-cross lines found at box junctions are designed to keep the junction free-flowing with traffic at all times as It is a prohibition to enter a box junction if your exit is not clear. See box junctions for further information on how to use box junctions and the law.

Wearing Safety Belt and Common Excuses for not wearing Safety Belts:

- I am pregnant, the belt would cause me discomfort
- I am sick, the belt would make me weary
- I am armed escort, the belt would reduce my chance of surviving an attack
- If there is an auto fire outbreak, the belt would hinder my escape
- I am wearing white starched brocade, the belt would make it dirty
- I just had a heavy meal of pounded yam and egusi soup, the belt would cause a stomach upset
- No need to worry, God is in control
- My car has airbags
- I am driving within the town, not on a highway, so no need for a seat belt
- The weather is hot, the seat belt would increase my sweating
- I don't like seat belt.

If you carefully go through these excuses, you would realize that they are not true. These excuses only expose the level of ignorance, laziness and irresponsibility of those giving them.

CHILD SAFETY

It is common to see mothers driving with their baby strapped to their stomach. What an unsafe act!

Statistics show that children and the underage are the most vulnerable group in the event of accidents. A child that is standing on the front passenger seat is not just a distraction to the person who is driving; he/she becomes the lead pellet in a **shot-put** game. In accidents, during the pre-crash period, the driver engages in swift swerving, hard braking and unsteady acceleration. This force of impact can propel a nine (9) months baby out of a moving vehicle the same way a big book in front of your dashboard can be thrown out. If you love your children, you must make provision for their safety in the car. Taking the children to school, church or other social functions is a normal routine in our driving activities. When you fasten your seat belt and allow your little son to stand or sit unprotected on the seat, you are indirectly saying "I have protected myself, but my son can go to hell". This is not good enough. You must also realize the risk of strapping a nine months old baby to an adult seat belt. The seat belt turns to a suicide rope during accidents. You must endeavour to provide, as a matter of necessity, child seats or carriers in your car to protect the child.

SAFE DRIVING TIPS

- Avoid speeding in residential areas. Be watchful for children playing on the roads and roadsides as well as other potential hazards.

- The best Driver is the one that takes off safely, move safely and arrive safely without having accident and without causing problem for others. Determine and take steps to drive safely at all times. Always remember that your family members and other loved ones are waiting for your safe arrival. Therefore, purpose not to turn them to mourners.

- Give way to children crossing. Be very watchful when driving in school environment and other places where there are children. Help children to be safe on the roads.

- Always drive with two hands and handle the steering correctly. If you lose the control of the steering, you will lose control of the vehicle and disaster will be the result.

- Better be late than be "The Late". Don't be in a hurry when you are driving. Plan your journey and take off early to avoid hurrying into the mortuary or grave.

- Avoid careless Driving because careless driving can cause accident for you with the accompanying consequents. Driving is a serious task, don't do it with levity.

- Understand and Obey all the Traffic Signs. Know the meaning and the implications of disobeying the Warning Signs, Regulatory Signs, Information Signs and Road Markings, Always obey the Traffic Signs, Traffic Lights and Traffic Officers.

- Slow down and never overtake at a bend, on a hill, on a bridge, at a junction, at a roundabout, at a business, on a railway and in a market environment.

- Never overtake on a hill, reduce your speed when it is dark, or cloudy, Drive slowly when you are on a rough, wet, muddy and rough road. Always adjust your driving according to the condition of the road. Never descend hills with the vehicle engine switched off.

- Apply the MSM rule (Mirror, Signal, Manoeuvre) Never move out of your lane without following the MSM or DAAR formulas for lane change or overtaking.

- Always watch out for obstacles on the road. Be very vigilant in gathering information about potential hazards on the roads such as open and water-filled pot-holes, stones, and other objects that could obstruct free movement of vehicle or cause accident. Also watch out for Diversion signs early enough.

- Always remember the driving forces (Kinetic energy, centrifugal force, etc). The more the speed and/or weight of your vehicle, the more the force in the vehicle and the more the possibility of crashing or somersaulting on a straight road and road bend.

- Always use seat belt. It is an offence not to use the seat belt. All vehicle Occupants are to use the seat belt and correctly.

- Avoid alcohol and other psychoactive drugs when driving. Alcohol and other psychoactive drugs negatively effects the brain and other organs of the body thereby making the drunk or drugged driver prone to errors and accidents.

- Drive according to the condition of the road. When you speed on a rough road, it could damage your vehicle or make you lose control of the vehicle thereby leading to preventable crashes.

- Give way to Pedestrians. Be patient with Pedestrians crossing the road. It is an offence to knock them down on their track or zebra crossing lane. Be conscious of the Pedestrians walking on the roads.

- Don't drive when you are under pressure (Emotional Pressure), or when you know your mind is seriously troubled or when you are stressed-up. It reduces your concentration and analytical skills.

- Avoid Tailgating. Always obey the 2-seconds or 4-seconds following-distance rules. Don't drive too close to vehicle in front of you, particularly in a free and fast-moving traffic. Following-distance depends on the speed of vehicles and the environmental factors.

CHAPTER 3

VEHICLE MECHANISM

In this topic, we shall be looking at the following objectives:

1) Meaning of Motor Vehicle
2) Component of Motor Vehicle
3) Parts of Motor Vehicle
4) What to do in Manual Transmission
5) What to do in Automatic Transmission
6) Troubleshooting of Vehicle Parts
7) Maintenance of major parts of the vehicle

VEHICLE MECHANISM

MEANING OF MOTOR VEHICLE

A motor vehicle is a self-propelled wheeled object that does not operate on rails. It is powered by an engine or motor, usually by combustion engine.

Motor vehicles could be identified by number of classes including automobiles or cars, buses, motorcycle, motorized bicycles, light trucks and Lorries.

COMPONENTS OF MOTOR VEHICLE

There are four major components of a motor vehicle:

1. **The Body:** This is the part that prevents rain or sun while driving. It has both exterior and interior parts, the interior part is made of the seats, dashboard and other features you can find is inside the vehicle while the exterior part is made of the mentally pan such as the door, burnet, trunk the wind shade etc.

2. **The Chassis:** This is the stronger part of the vehicle where the body is fitted. It is the under net pan where jacks are placed most at times.

3. **The Suspensions:** This are part of the vehicle that made the vehicle to move smoothly while driving examples are: ball joints, knocks, shock absorber, strings, toy rod etc.

4. **Engine:** This is the power house of the vehicle, where combustion takes place. There is no vehicle that can move without the engines.

PARTS OF THE VEHICLE (BODY)

Car Body Part

A car is a four-wheeled motorized vehicle that people use to move from one place to another (transportation). Generally, cars run on roads that seat one to eight people, have four wheels, and mainly transport people rather than goods.

When we look at its history, the first car that is Benz Patent-Motorwagen was invented by German inventor Carl Benz in the year of 1886. In the 20th century, cars came into global use and became widely available in different models and styles.

Cars have controls for driving, parking, passenger comfort, and a variety of parts. When you open your car hood up or you see the down of your car, then you usually found the engine, transmission, axles, differential, suspension, etc.

These are the internal parts of the car but what about the external parts? Now when we come to the exterior parts of the car, many people do not have any idea of which parts the car is made of and what is their role.

Therefore, we have brought you the complete list of car body parts and their functions. So let's discuss them.

Parts of Car Body

Following are the main parts of car body:

1. Body shell
2. Hood or bonnet
3. Front bumper

4. Rear bumper
5. Bumper grille
6. Crash guard or bullbar
7. Head light
8. Fog lamp
9. Indicator lights
10. Wiper blade
11. Radiator
12. Radiator supports
13. Cowl panel
14. Quarter panel
15. Fender
16. Fender liners
17. Roof
18. Sunroof
19. Mirrors
20. Doors
21. Door handle
22. Window glass
23. Quarter window
24. Trunk or decklids
25. Mud flaps
26. Wheels
27. Hubcap
28. Dashboard
29. Number plate
30. Tail lights

Read Also: What is the function of a cylinder block in an engine?

#1 Body Shell

The vehicle body shell is the functional backbone. It is the body of a car that rests in the chassis and fits the engine, mechanical and electrical systems, seats, etc. It is designed to carry the weight of all components that are present in the car

2 Hood or Bonnet

The car hood is also known as a bonnet in some countries. This is the type of thin sheet cover that is hinged and rests over the engine of motor vehicles. It includes engine, battery, coolant, windscreen fluid, cooling fan, compressor, alternator, and many more.

The hood allows direct access to the engine compartment for maintenance and repair purposes. In addition, it also protects these parts from direct sunlight and dust. A hidden latch is commonly used along with the hood to hold it securely when you're taking a look inside your car.

#3 Front Bumper

The bumper may seem like an additional part but the simple structure actually plays an important role in your car. Generally, bumpers are bars that protect a vehicle when it collides with something.

The function of the front bumper is to protect your car if a sudden collision happens. In this case, it absorbs most of the impact during low-speed collisions to prevent serious damage to the driver, vehicle, and passengers.

#4 Rear Bumper

The rear bumper is designed to prevent heavy damage when you, unfortunately, hit a wall while taking a reverse turn. It reduces or prevents physical damage to the front and rear sides of vehicles in low-speed accidents. These car body parts

usually absorb shocks from the car accident. The rear bumper is basically made of steel, aluminum, rubber, or plastic and primarily protects the trunk, grille, fuel, exhaust, and cooling systems.

#5 Bumper Grille

The bumper grille covers the front body of the vehicle and allows your engine to keep cool. When you drive your car, it sucks the air through the grille which serves to provide ventilation through the engine bay.Primarily, it protects the radiator and allows cold air to enter the radiator of the car. In addition to the front location, they are also located in the front wheels for brake cooling, in the cowl for cabin ventilation, or on the rear trunk lid in rear-engine vehicles.

6 Crash Guards or Bullbars

The crash guards are mounted to the front frame or chassis of the car. This is mostly seen in SUVs to protect them from damage in case of an accident. These are the essential car body parts that play a key role to keep the vehicle moving after a collision.

These are typically made of heavy-duty steel and can effectively shield the front end of the vehicle. Moreover, the design of this accessory gives a stylish look to your vehicle and also provides real protection.

#7 Head Lights

Basically, everyone knows the primary function of headlights on cars is to illuminate the road and facilitate fatigue-free and safe driving. There are two types of headlights, low beam, and high beam.

These headlights are attached to the front end of the vehicle. They allow the driver to see the roadway in the dark, while also indicating to other drivers that a car is present. There are types of lights used in cars and each has its own function.

#8 Fog Lamp

The purpose of fog lamps is to allow brightness in situations when visibility is less than 100m. They help to illuminate under the fog to see the road surface and prevent the additional beams from the fog. There are mainly two types of fog lamps used in vehicles.

- **Front Fog Lamps:** Many front fog lights are selectively yellow because it filters out the blue component of white light, which causes the most shine. However, not every yellow lamps are fog lights and not every fog lamps are yellow.
- **Rear Fog Lamps:** These are more useful than front fog lamps. They are a bright red light (similar to a brake light) that is lit in poor visibility to make the vehicle more specific for low traffic. They are useful when you are driving much slower than usual and when a vehicle is behind you, they can dazzle other drivers to stop.

#9 Indicator Lights

Indicator lights are available in red, orange and some are white in color. They can be located on the front, rear, and sometimes on both the left and right sides of the car. These are used to indicate a desired change of direction, whether turning left or right or going out into traffic.

You need to use them at right time to give other drivers enough time to react and adapt to your signal. Once you have completed the turn make sure the indicator is off otherwise it may confuse other drivers.

#10 Wiper Blade

Almost all vehicles including cars, trucks, buses, etc. have wiper blades and are very important for the clear vision of the driver. These are used to clear snow, water, and/or debris from the vehicle's front window so that the operator can see what lies ahead of them.

They are very useful during rainy weather, water droplets on the windshield constantly block the driver's visibility which can lead to major accidents. They are made of rubber that is degradable and becomes less effective over time. That's why it's important to replace them every 6-12 months.

#11 Radiator

The radiator sits right behind your car's front grille. It is located at the center of the vehicle's cooling system that monitors and regulates the temperature of the engine and prevents it from overheating.

Its purpose is to keep the engine's coolant fluid at the proper level. As the coolant circulates throughout the engine, it heats up and the cooling fins inside the radiator cool the liquid as it passes over them.

#12 Radiator Supports

The vehicle radiator is supported and mounted by a mechanism called radiator support. It is a frame made of steel, plastic, or aluminum that protects the radiator from damage by securing it under the hood of the car. It also houses the condenser assembly and cooling fan system so that they are not damaged while the car is running.

#13 Cowl Panel

Cowl panels are also important car body parts. These are used as a cover that fills the gap between the hood and windshield of the car. It also supports the dashboard and ensures that no unwanted parts get into the windshield wiper system or the cabin filter area.

#14 Quarter Panel

It is a side section of an automobile body that usually wraps around the wheel well, between the door and trunk lid, or between the door and the hood. It

supports the back panel and other rear panels which may include the trunk of the car, as well as the rear fenders/bumpers.

#15 Fender

The fender is the curved part of the car's body that sits on top of the wheels and holds them in place. It is not only a safety component but also enhances the overall look of your vehicle. Its primary function is to shield and protect the passenger compartments by preventing sand, mud, rocks, liquids, and other roads spray from being thrown into the air by the rotating tire.

#16 Fender Liner

In every type of vehicle, each wheel has a separate fender liner. The function of fender liners is to prevent dirt, mud, water, environmental toxins, and other impurities from seeping into the engine bay causing serious damage.

In addition, it also helps to protect the wires and other components inside the wheel well from corrosion. Driving a vehicle without a fender liner is not recommended as it acts as both a buffer and a barrier between your car's engine, hood, radiator, headlights, and windshield.

#17 Roof

A roof is the top part of a vehicle that sits above the passenger compartment, protecting the vehicle occupants from sunlight, wind, rain, and other external elements.

The car ceilings are typically coated with headliners that provide insulation against heat and noise, and also hide wires and hardware for electrical components, antennas, and other accessories.

The sunroof gives passengers a clear view of the sky, keeps the car ventilated, and lets the sunlight in, creating a feeling of open space. This is a type of panel on the roof of a car that either slides or can be pulled out to allow light in.

These are quite expensive as you will have to pay extra for all the mechanisms that operate the sunroof. They are also high maintenance because the rubber, glass, motor, and all other components require frequent maintenance.

#19 Mirrors

There are mainly two types of mirrors used in vehicles that are side-view mirrors and rear-view mirrors.

1. **Side-View Mir**

These are also known as wing mirrors. These mirrors are located on the exterior of the vehicles to help the driver see areas behind and side of the vehicle or outside the driver's peripheral vision.

Also, it will alert the driver about possible accidents that happen from behind. The advantage of side mirrors being convex is that you get a wider view of each side of the car which helps reduce blind spots.

2. Read-View Mirror

They serve multiple purposes that help to keep you safe as a driver. It gives you an alert driving experience by allowing you to see behind your vehicle without turning your head. In addition, they are especially important when a vehicle is moving in reverse gear.

#20 Car Doors

A door is a type of opening, usually hinged on the exterior of a vehicle. Sometimes it is attached to other mechanisms such as a track to enter and exit the vehicle. There are different types of car doors available that most people might not be aware of.

Doors often include windows for visibility from inside the car and can be locked to secure the vehicle. These are operated manually or with the help of power supplied by the vehicle. Power doors are used in minivans, luxury vehicles, or modified cars.

#21 Window Glass

The basic reason for the use of window glass in cars is visibility. Whether at the front, side, or rear of the car, the visibility managed by the glass is extremely useful.

The glass allows passengers to see where they are going and allows natural sunlight or artificial street lighting to enter the vehicle. There are usually two types of window glass used, single-layer toughened glass or laminated safety glass.

#22 Quarter Window

It is a type of side window that is located before the front door glass or after the rear door glass. In some models, the fixed quarter window may be placed in the corner or “C-pillar” of the vehicle.

They provide a quick peek of the road around the vehicle so that the driver can turn, speed up, park, or change lanes safely. These windows are often found on older vehicles. These are small triangular in shape at the front and separate from the main window.

#23 Door Handle

Door handles help the driver or passengers to get in or out of the car. Door handles are the most important component as they contain door locks. Usually, we use the door handle to unlock the car from outside or inside. There are different types of door handles available according to the car model.

#24 Trunk or Decklids

The trunk lid (also known as dickey) of a car is the main storage or luggage compartment which is often located at the rear of the vehicle such as sedan, coupe, or convertible.

The trunk of a car is more than just storage and must be used for the actual purpose of carrying goods. It is an important storage space, so it is necessary to clean it regularly. Also, keep in mind that if you are loading more luggage then the engine will consume more fuel.

#25 Mud Flaps

Whether you have a car, an SUV, or a truck, getting mud flaps for your vehicle is necessary. This is useful when your tires are constantly exposed to mud, dirt, rocks, salt, water, and other elements on the road.

As the name suggests, mud flaps are meant to catch dirt and stones and ensure that it doesn't fly straight into your vehicle from back and front. A car without mud flaps will require more regular maintenance.

#26 Wheels

The most basic and important parts of a car body that have always been in use are the wheels. These are circular forms that generate rotary motion and are responsible for moving the car from one point to another.

The tire is the rubber part that wraps around the wheel and grips the road surface. Although the wheels can spin without tires, the car does not go very far. Without them, the wheels of the car would slip on the road faster without moving forward. Nowadays, there are different types of tires easily available in the market.

#27 Hubcap

It is a decorative disc on an automobile wheel that covers the central part of the wheel. The function of the hubcap is to cover wheel hub and wheel fasteners to reduce the dirt and moisture collection. It also enhances the overall structure of the wheel.

When you drive without a hub cap, all kinds of dirt and debris get trapped in the tires, which can lead to tire wear and tear. By having a hubcap, foreign particles do not damage your wheels and provide longer life.

#28 Dashboard

The dashboard is the controlling panel of any kind of vehicle. This is also known as dash or instrument panel. It lies within the central console of a vehicle and is usually located directly ahead of the drive.

The dashboard shows the driver tools and controls for operating the vehicle. It has simple controls (eg, steering wheel) and an array of instrumentation to show speed, fuel level, and oil pressure. Modern types usually feature information, climate control, and entertainment systems.

#29 Number Plate

Due to the Motor Vehicle Act of the government, it is necessary to have a number plate on every vehicle. The number plate reflects the very specific details of the vehicle and consists of four important elements.

It also gives a unique identity to the vehicle. Nowadays, all vehicles on the road are preferred to display registration on both the front and rear sides of the vehicle.

#30 Tail Lights

The taillights consider the safety aspect of the vehicle. These lights allow your vehicle to be seen during low visibility conditions and alert other drivers that you are slowing down. On most vehicles, the tail light is red and the brake light is more bright red.

The taillights stay ON when you turn ON your headlights or when your parking brake is ON. While the brake light will light up immediately when you apply pressure to the brakes. So the brake light and tail lights are not the same.

31. **Radiator**: Radiator is heat exchangers use for cooling internal combustion engine, such as motorcycles, and motor vehicle. Internal combustion engine are often cooled by circulating an engine water called coolant through the engine block where it is heated and through a radiator where it loses it heat to the atmosphere and then return to the engine.

Why Do I Need A Radiator In My Car?

All radiators, in vehicles or other applications, do the same job. They dissipate heat from the liquid flowing through them into the atmosphere. The purpose of a radiator in a car is to lower the temperature of the hot liquid coming from your engine & return it cooled. This then reduces the heat that is produced through the normal running of the motor. The cooling is achieved by air flowing over the large surface area of the radiator itself.

Airflow and why it is so important for my radiator

If for some reason air is prevented from flowing over the fins of the radiator, it cannot perform its cooling function. When driving forward a car creates it's own airflow but when stationary or moving slowly this has to be created by using a radiator fan. Of course, if the fan is not working you may experience an overheating car, particularly if you are driving at low speed in traffic. Sometimes the radiator could be blocked up with dirt and grime which again will not allow for proper airflow.

Coolant In The Radiator

The fluid that flows through your radiator (called coolant) is the lifeblood of the cooling system. It is a precise mix of water and an additive (antifreeze) that is recommended for use in your vehicle. The level of coolant must be checked regularly and if liquid is being lost from the system there is probably a leak somewhere. If a leak exists an ADRAD **radiator repair expert** can locate and repair it before it becomes a costly issue. Coolant degrades with use and periodically needs to be replaced. Your vehicle also needs a radiator flush about once a year to get rid of deposits that have built up through normal operation. Leak detection, radiator leak repair and regular maintenance of your radiator & radiator hoses are standard services offered by all ADRAD agents throughout New Zealand.

Radiator Maintenance In Cars.

To avoid the troublesome issue of your vehicle overheating radiators need to be maintained on a regular basis. Some of this can be done by the vehicle owner, for example, checking on the radiator coolant level or inspecting the radiator cap. This website has some great **radiator maintenance** tips for you.

Most other procedures like radiator leak detection, cooling system flush and radiator repairs are best handled by an expert at an ADRAD radiator repair shop.

In addition to radiator parts, radiator repairs & radiator maintenance we also sell aftermarket radiators for all types of cars. Contact your nearest agent for quality radiator service or to enquire about radiator flush cost or even radiator replacement cost. All our work, parts and products are covered by a 2 year, nation-wide **warranty** support.

How does a car radiator work?

How a radiator works is through simple heat transference. Basically, it cools the engine down by taking heat out of the engine, cooling it down with air. Liquid coolant circulates around the metal of the engine, this liquid absorbs the heat from the engine and then is pumped from the engine and into the radiator where it passes through thin pipes. These pipes are exposed to air. Often there is a fan which pushes air past the radiator, helping the coolant inside to cool down faster.

How does a radiator work?

The fins are an important part of the radiator assembly. They make sure that the most surface area is exposed to the air as possible – a thin piece of metal will cool a *lot* quicker than a thick piece. This is why if the fins are damaged the radiator will not work as efficiently.

In conclusion, the car is beneficial for its convenience. The above-mentioned car body parts are very essential for every vehicle. Without these parts, the vehicle may not perform well on the road and that can lead to heavy breakdowns or accidents

VEHICLE PARTS (ENGINE COMPONENTS)

If you have a bit of an understanding of your car's engine parts and how they work, then you will feel more comfortable driving it and taking it for service and maintenance. Perhaps you have realized you need to take your car to engine

service, but stopped to ponder what parts make up an **engine and how do they work?** This knowledge will only benefit you when it comes to taking care of your car, saving your time, effort, and money as well as ensuring your vehicle maintains its value.

Know Your Engine

The engine is a power generator/power plant or a motor, which provides power to drive the automobile.

The **engine** is the heart of your car. It is a complex machine built to convert heat from burning gas into the force that turns the road **wheels**. It consists of two basic parts: the lower, heavier section is the **cylinder block**, a casing for the **engine's main moving parts**; the detachable upper cover is the **cylinder head**.

In most automobile engines, the explosive power of the mixture of air and gasoline drives the **pistons**. The pistons turn a **crankshaft** to which they are attached. The rotating force of the crankshaft makes the automobile's wheels turn.

A motor revolving in an elliptical chamber is connected to a shaft, which finally drives the rear wheels. In most automobiles, the engine is mounted at the front end of the car, with the clutch and gearbox immediately behind it; the engine, clutch, and gearbox are assembled into a single unit.

A number of systems are necessary to make an engine work. A lubrication system is needed to reduce friction and prevent engine wear. A cooling system is required to keep the engine's temperature within safe limits. The engine must be provided with the correct amount of air and fuel by a fuel system.

The mixture of air and fuel must be ignited inside the cylinder at just the right time by an ignition system. Finally, an electrical system is required to operate the cranking motor that starts the engine and to provide electrical energy to power engine accessories.

While there are several components on an engine, we've compiled a list of the most essential car engine parts and their functions, that power your vehicle.

Engine Parts Name

The list of Car Engine parts Name:

32. Engine block
33. Piston
34. Cylinder Head
35. Crank Shaft
36. Camshaft
37. Timing belt
38. Engine Valves
39. Oil Pan
40. Combustion chamber
41. Intake manifold
42. Exhaust manifold
43. Intake and Exhaust valves
44. Spark Plugs
45. Connecting Rod
46. Piston Ring
47. Gudgeon pin
48. Cam
49. Flywheels
50. Head gasket
51. Cylinder Liner
52. Crank Case
53. Distributor
54. Distributor o ring
55. Cylinder head cover
56. Rubber grommet
57. Camshaft pulley
58. Oil filter
59. Water pump
60. Timing belt drive pulley
61. Oil pan drain bolt

Car Engine Parts

Car engines are designed around sealed, resilient metal cylinders. Most modern vehicles have between four and eight cylinders, though some vehicles can have as many as sixteen! The cylinders are made to open and close at precisely the

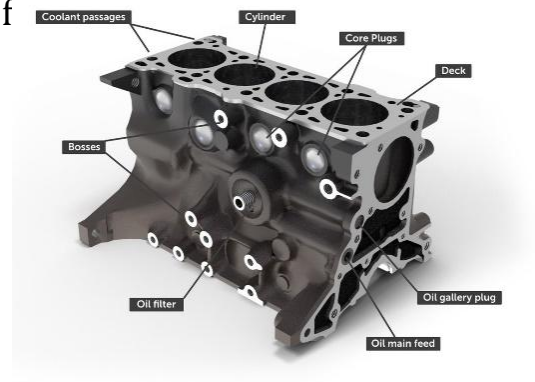
correct time to bring in fuel to combine with the spark for burning internally, and to release the exhaust gases produced.

While many of us think of the engine as one major component, it's actually made up of several individual components working simultaneously. You may have heard of some of these car engine parts names but it's important to know what their role is and how they relate to other components within the engine.

The different parts that make up your car's engine consist of the engine block (cylinder block), the combustion chamber, the cylinder head, pistons, the crankshaft, the camshaft, the timing chain, the valve train, valves, rocker arms, pushrods/lifters, fuel injectors, and spark plugs.

32. Engine block

The **engine block** is the main part of an engine. Often made of aluminum or iron, it has several holes to contain the cylinders as well as provide water and oil flow paths to cool and lubricate the engine. Oil paths are narrower than water f



The engine block also houses the **pistons**, **crankshaft**, **camshaft**, and between four and twelve cylinders depending on the vehicle, in a line, also known as inline, flat, or in the shape of a V.

All other parts of the motor are essentially bolted to it. Inside the block is where the magic happens, such as combustion.

33. Piston

Are a cylindrical apparatus with a flat surface on top. The role of the **piston** is to transfer energy created from combustion to the **crankshaft** to propel the vehicle. Pistons travel up and down within the cylinder twice during each rotation of the crankshaft.

Pistons on engines that rotate at 1250 RPM, will travel up and down 2500 times per minute. Inside the piston, lie **piston rings** that are made to help create compression and reduce the friction from the constant rubbing of the cylinder.

34. Cylinder head

Attached to the engine through cylinder bolts, sealed with the **head gasket**.

The **cylinder head** contains many items including the valve springs, **valves,** lifters, pushrods, rockers, and **camshafts** to control passageways that allow the flow of intake air into the cylinders during the intake stroke.

As well as exhaust passages that remove exhaust gases during the exhaust strok

35. Crankshaft

The **crankshaft** is located in the lower section of the **engine block**, within the crankshaft journals (an area of the shaft that rests on the bearings).

This keenly machined and balanced mechanism is connected to the **pistons** through the **connecting rod**.

Similar to how a jack-in-the-box operates, the crankshaft turns the piston's up and down motion into a reciprocal motion, at engine speed.

36. Camshaft

Varying from vehicle to vehicle, the **camshaft** may either be located within the **engine block**or in the **cylinder heads**.

Many modern vehicles have them in the cylinder heads, also known as Dual Overhead Camshaft (DOHC) or Single Overhead Camshaft (SOHC), and supported by a sequence of bearings that are lubricated in oil for longevity.

The role of the camshaft is to regulate the timing of the opening and closing of **valves** and take the rotary motion from the crankshaft and transfer it to an up and down motion to control the movement of the lifters, moving the pushrods, rockers, and valves.

37. Timing Belt/Chain

A **timing belt**, timing chain, or cambelt is a part of an engine that synchronizes the rotation of the crankshaft and the camshaft so that the **engine's valves** open and close at the proper times during each cylinder's intake and exhaust strokes.

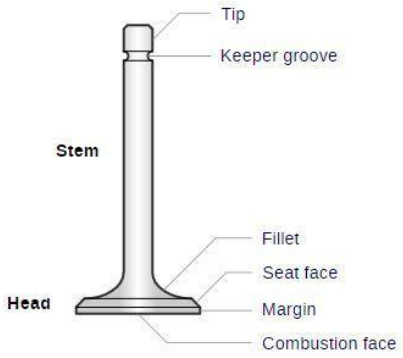
In an interference engine, the timing belt or chain is also critical to preventing the piston from striking the valves. A timing belt is usually a toothed belt, a **drive belt** with teeth on the inside surface. A timing chain is a **roller chain**.

The belt is made of heavy-duty rubber with gears to grip the **pulleys** from the **camshaft** and crankshaft. The chain, much like your bike chain, wraps around pulleys with teeth.

38. Engine Valves

Engine valves are mechanical components used in engines to regulate the air, fuel, and exhaust gas flow in the **combustion chambers** or **cylinder head** during engine operation.

The valve operation is very simple: the cam pushes the valves down into the cylinder against the spring, opening the valve so gases can flow, and then letting the valve shut under the force of the spring.



The pressure in the combustion chamber rather neatly helps seal the valve shut.

39. Oil Pan

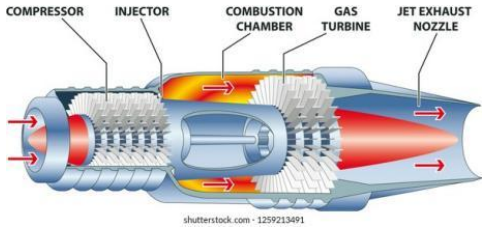
The oil pan is a vital, though simple, part of your **engine's lubrication system**. Oil circulates through parts of your engine to keep them lubricated. It reduces friction so everything works smoothly. Without oil, friction would quickly destroy your engine.

The oil pan keeps that oil contained in the **lubrication system**, so it's important that the oil doesn't leak out. Since it's a metal part attached to another metal part, there is a gasket between the oil pan and the part of the engine it attaches to.

40. Combustion chamber

A **Combustion Chamber** is the area within the Cylinder where the fuel/air mix is ignited. As the **piston** compresses the fuel/air mix and makes contact with the **Spark Plug**, the mixture is combusted and pushed out of the Combustion Chamber in the form of energy.

The Cylinder houses many of the important components of an **Internal Combustion Engine** including the Injector Nozzle, **Piston, Spark Plug, Combustion Chamber**, and others.



41. Intake manifold

The intake manifold in a car is the part of the engine that distributes the airflow between the cylinders. Often an intake manifold holds the throttle valve (throttle body) and some other components.

In some V6 and V8 engines, an intake manifold can be made of several separate sections or parts.

The intake air flows through the air filter, intake boot (snorkel), then through the throttle body, into the intake manifold plenum, then through the runners, and into the cylinders. The throttle valve (body) controls the engine rpm by adjusting the amount of airflow.

~~35.~~42. Exhaust manifold

The exhaust manifold is generally simple **cast iron** or **stainless steel**unit that collects engine exhaust gas from multiple cylinders and delivers it to the exhaust pipe. It is connected to exhaust valves. Its construction is the same as the inlet manifold.

The exhaust manifold has the same function in both petrol and diesel engines, in both cases, it carries exhaust gas.

43. Intake and Exhaust valves

Inlet and exhaust valves are used to control and regulate the charge (or air) coming to the engine for burning and exhaust gases going out from the cylinder respectively.

They are provided either on the cylinder heads or on cylinder walls. They commonly have a mushroom-shaped head.

In the case of Petrol engines, air and fuel mixture enters through the inlet valve. But in **diesel engines**, only air enters through the intake valve. The exhaust valve in both cases is meant for letting exhaust gases out.

Intake valves are connected to the intake manifold and exhaust valves are connected to the exhaust manifold. Both intake and exhaust manifolds are discussed above.

44. Spark plug

A **spark plug** is a device for delivering electric current from an **ignition system** to the **combustion chamber** of a **spark-ignition engine** to ignite the compressed fuel/air mixture by an electric spark while containing combustion pressure within the engine.

A spark plug has a metal threaded shell, electrically isolated from a central electrode by a ceramic insulator.

The central electrode, which may contain a resistor, is connected by a heavily insulated wire to the output terminal of an ignition coil or magneto.

45. Connecting Rod

A **connecting rod** is the part of a piston engine that connects the piston to the crankshaft. Together with the crank, the connecting rod converts the reciprocating motion of the **piston** into the rotation of the crankshaft.

The connecting rod is required to transmit the compressive and tensile forces from the piston. In its most common form, in an internal combustion engine, it allows pivoting on the piston end and rotation on the shaft end.

The predecessor to the connecting rod is a mechanical linkage used by water mills to convert the rotating motion of the water wheel into reciprocating motion.

46. Piston Ring

A **piston ring** is a metallic split ring that is attached to the outer diameter of a piston in an **internal combustion engine** or **steam engine**.

The main functions of piston rings in engines are:

- Sealing the **combustion chamber** so that there is minimal loss of gases to the crankcase.
- Improving heat transfer from the **piston** to the cylinder wall.
- Maintaining the proper quantity of the oil between the piston and the cylinder wall
- Regulating engine oil consumption by scraping oil from the cylinder walls back to the sump.

Most piston rings are made from **cast iron** or **steel**.

47. Gudgeon pin

A gudgeon pin, also known as a wrist pin, is an important component in an internal combustion engine.

It creates a connection between the connecting rod and the piston. Gudgeon pins can also be used with connecting rods and wheels or cranks.

48. Flywheel

A **flywheel** is a mechanical device that uses the conservation of angular momentum to store rotational energy; a form of kinetic energy proportional to the product of its moment of inertia and the square of its rotational speed.

The torque provided by the engine is not uniform and is fluctuating in nature. If a vehicle continues to move with this fluctuating power. It will cause huge discomfort to the rider and also it will decrease the life of its different parts.

Hence to deal with the problem of fluctuating load a flywheel is used. A **fly wheel** is generally mounted on the camshaft. It stores torque when its value is high and releases it when its value is low in a cycle of operation. It acts as a torque buffer.

49. Gasket

A gasket is a ring or sheet composed of a supple material used in static applications to seal joints, flanges, and other mating surfaces to prevent leakage.

These are different types of gasket generally used in an engine:

- **Head gasket:** A **head gasket** provides the seal between the **engine block** and **cylinder head**. Its purpose is to seal the combustion gases within the cylinders and to avoid coolant or engine oil leaking into the cylinders. Leaks in the head gasket can cause poor engine running and/or **overheating**.
- **Intake manifold gasket:** The intake manifold gasket seals off the small gap between the manifold and the engine, preventing air, coolant, and oil from leaking. Over time, the intake manifold gasket endures a lot of wear and tear. Eventually, it may crack or warp in ways that allow leaks to occur.

- **Exhaust manifold gasket:** The exhaust manifold gasket is usually a multi-layered gasket that contains metal and other materials that are designed to provide the best seal possible. As the exhaust manifold gasket is the first in the exhaust system, it is a very important seal that should be inspected if any problems arise.
- **Water pump gasket**: The **water pump** gasket is a ring-like part made of a durable material that can withstand varying temperatures. The water pump is one of the main components that pushes coolant around the engine, so a leak could start between it and the engine block if it does not have a well-fitting water pump gasket to keep it sealed.
- **Oil pan gasket**: The oil pan gasket itself seals the oil pan to the bottom of the engine block and prevents oil from leaking as it moves from the pan to the engine and back. Because oil is constantly flowing, no vehicle is impervious to oil leaks, though. Often oil leaks stem from the oil pan or from a worn oil pan gasket.

50. Cylinder Liner

A cylinder liner is a thin metal cylinder-shaped part to be fitted into an engine block to form a cylinder. It is one of the most important functional parts to make up the interior of an engine.

The cylinder liner, serving as the inner wall of a cylinder, forms a sliding surface for the piston rings while retaining the lubricant within.

During use, the cylinder liner is subject to wear from the rubbing action of the piston rings and piston skirt. This wear is minimized by the thin oil film which coats the cylinder walls and also by a layer of glaze that naturally forms as the engine is run in.

51. Crank Case

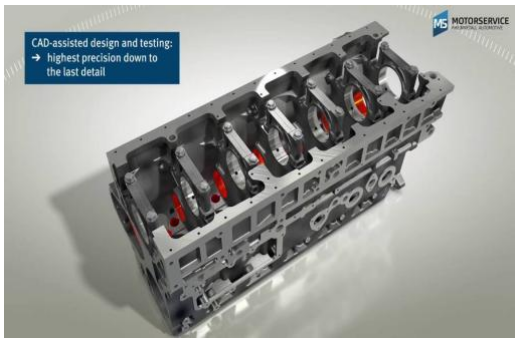
A crankcase is the housing for the crankshaft in a **reciprocating internal combustion engine**. In most **modern engines,** the crankcase is integrated into the **engine block**.

Two-stroke engines typically use a crankcase-compression design, resulting in the fuel/air mixture passing through the crankcase before entering the cylinder(s). This design of the engine does not include an oil sump in the crankcase.

Four-stroke engines typically have an oil sump at the bottom of the crankcase and the majority of the engine's oil is held within the crankcase.

The fuel/air mixture does not pass through the crankcase in a four-stroke engine, however, a small amount of exhaust gasses often enters as "blow-by" from the **combustion chamber**.

The crankcase often forms the lower half of the main bearing journals (with the bearing caps forming the other half), although in some engines the crankcase completely surrounds the main bearing journals.



52. Engine Distributor

A distributor is an enclosed rotating **shaft** used in spark-ignition internal combustion engines that have mechanically timed ignition.

The distributor's main function is to route secondary, or high voltage, current from the ignition coil to the **spark plugs** in the correct **firing order**, and for the correct amount of time.

Except in magneto systems and many modern computer-controlled engines that use crank angle/position sensors, the distributor also houses a mechanical or inductive breaker switch to open and close the ignition coil's primary circuit.

53. Distributor ring

Distributors commonly employ a specifically sized o-ring that fits on the distributor's **shaft** to seal it with the engine referred to as the distributor o-ring.

The distributor o-ring simply seals the distributor housing with the engine to prevent oil leaks at the base of the distributor. When the o-ring fails it can cause oil leaks from the base of the distributor, which can lead to other problems.

54. Cylinder Headcover

In many modern **four-stroke engines**, the cylinder head cover houses the upper actuation elements of the engine control unit as well as the valves in the crankcase ventilation with all its peripheral devices.

Additionally, it protects the engine from dirt or other foreign objects.

55. Rubber Grommet

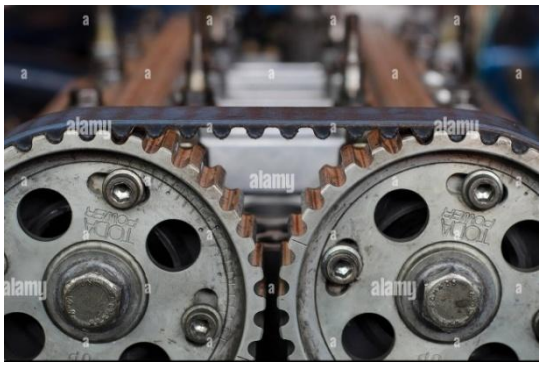
Rubber grommets are used to protect or cover holes and reduce vibration. Inserting a rubber grommet will help eliminate sharp edges and protect the

engine valve to pass through a hole. The rubber grommet will help shield the valve from damage.

56. Camshaft Pulley

A cam pulley is part of the timing system in an engine used to control the rate of rotation of the **camshaft**, the component that controls the poppet valves responsible for air intake and exhaust in the cylinders.

The cam pulley articulates with the timing chain to rotate the **camshaft** in synchronicity with the crankshaft.



57. Oil Filter

Your car's oil filter removes waste, too. It captures harmful debris, dirt, and metal fragments in your motor oil to keep your car's engine running smoothly.

Without the oil filter, harmful particles can get into your motor oil and damage the engine. Filtering out the junk means your motor oil stays cleaner, longer.

58. Timing belt drive pulley

A timing belt pulley is a specialized **pulley system** with teeth or pockets along the outside of the pulley body's diameter.

The teeth or pockets on the outside of the pulley are not used for power transmission. Rather, they engage the pulley **belt**, assisting with timing and averting misalignment.

59. Water Pump

A **vehicle's water pump** is a belt-driven pump that derives its power from the crankshaft of the engine. Designed as a centrifuge, the water pump draws the cooled fluid from the **radiator** through the pump's center inlet.

It then circulates the fluid outward into the **engine** and back into the **car's cooling system**.

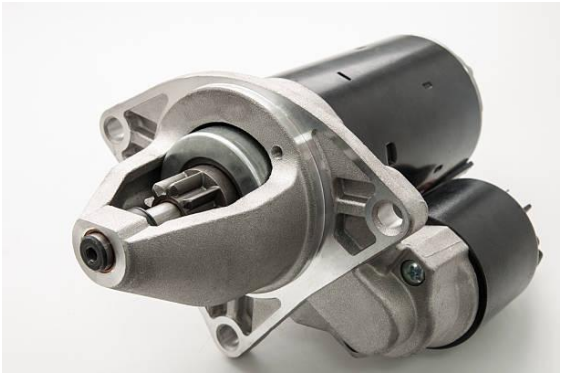
60. Oil pan drain bolt

The oil drain plug is typically located on the bottom of the engine on the oil pan. It is used to drain the oil from your pan during an oil change. If you notice a leak at the oil plug, in some cases it can be as simple as replacing the gasket.

If the bolt or oil pan has been cross-threaded, you may need a new oil drain plug. In some cases, an oversized oil drain plug will cut new threads to help you avoid replacing the entire oil pan.

The Major Electrical Components Consist of as Follows;

Starter: It serves only one but very significant purpose and that is to start your vehicle. The battery-powered starter rotate the flywheel, helping the crankshaft to run at a required speed to keep the engine running. Starter receives a punch of electric energy in second therefore it is advised to keep headlights, audio system off before using the starter. It will ensure the long life of it.



Fuel Pump Switch: Petrol engine needs sparks to fire and the ignition coil helps to burn the fuel while in diesel engine needs the pump to remain on to keep injecting fuel so that the engine would continue to run.

Cooling Fans: In the traditional model of cars, cooling fans (also known as radiator fan) was connected with the engine. However, with the advancement of technology in the car, mainly after 4WD advancement, the cooling fans are connected to the battery so that it can run even when the engine of the car is off.

Air Conditioner Blower: There are fans in the passage of the switch knob which are electric-powered. The fans circulate the air into the car cabin.

Lighting: The entire lighting system in the car is electrified. They are battery-powered so that they can be kept on even when the car is not running or off. In the traditional model, the gas was used for lights.

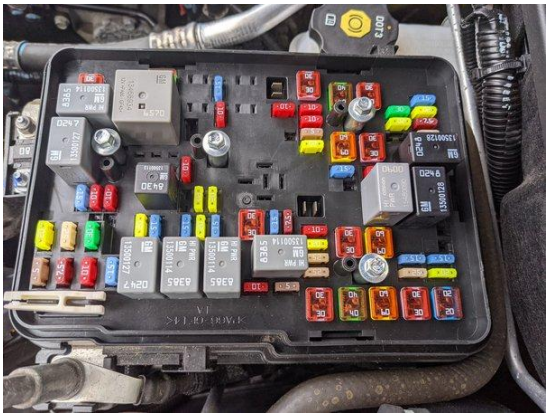
Motor: There are some of the motors in the car which are both electric and battery-powered. The wiper ensures safe driving by wiping the rainwater from the front glass while window glass can also be operated through the switch. Besides, the side glasses in most of the cars are also adjusted through a switch which is both battery and electric-powered.

ECU; You may have heard this referred to as an engine control unit or an engine management system before, too. An ECU's main job is to **keep the engine working smoothly**. On cars fitted with electronic fuel injection, an ECU can control the amount of fuel that enters the engine's cylinders. **Auto Care lists the symptoms of a bad ECU below.**

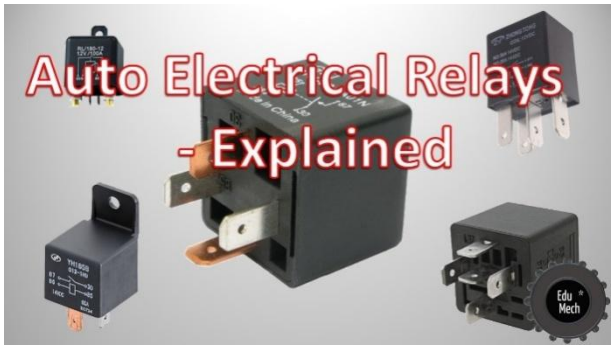
1. Engine Lags or Surges. Because the ECU controls your engine's timing and fuel usage, you might notice engine performance issues such as lagging or surging in the module is going bad. ...
2. Engine Misfires and Stalls. ...
3. Your Car Won't Start. ...
4. Check Engine Light Alert.

Fuse Box: Car fuses are components that **protect electrical wiring** in cars and other vehicles. They protect against over current and short-circuiting by disconnecting the circuit if a harmful level of current is detected. How do I know if my car has a bad fuse box? **Usually a problematic fuse box will produce a few symptoms that can alert the driver of a potential issue.**

1. Fuses blow frequently. One of the first symptoms of a problem with the fuse box is fuses blowing frequently. ...
2. Loose fuses. Another symptom of a bad or failing fuse box is loose fuses. ...
3. Burned fuses or terminals.



1. Relays: Relays are the switches that aim at closing and opening the circuits electronically as well as electromechanically. It **controls the opening and closing of the circuit contacts of an electronic circuit**. When the relay contact is open (NO), the relay isn't energized with the open contact. Relays in general are used to enable a low amperage circuit to switch on or off a higher amperage circuit, like turning on your headlights. If you were to try and directly hook up your headlights to the headlight switch you would exceed the amperage rating of the switch, melt wires, and risk an electrical fire. Car not starting: Another symptom of a faulty ignition relay is a no power condition. **If the relay fails it will cut off power to fuel pump and ignition system, which will result in a no power, and therefore no start condition**



2. Combination Switch
3. Peripherals
4. Signal Transmission
5. Wiring,
6. Sensors
7. Actuators
8. Oxygen sensor
9. Generator
10. Solenoid
11. Armature
12. Brain box
13. Plug wires
14. bulbs

These are very crucial parts for the car and when any one of them is not functioning properly, experts suggest that one should immediately rush to the mechanic to avoid any dangerous (very costly) harm. You can easily find the electrical parts of the car as most of the **automobiles parts manufacturing companies** produce these parts at primary level.

Common Engine Problems

With so many mechanisms performing many tasks at lightning speed, over time, parts may begin to wear causing your car to behave differently. Here are the most common engine problems and their associated symptoms:

- **Poor compression** – Results in loss of power, misfiring, or no-start.
- **Cracked engine block** – Causes overheating, smoke coming from the exhaust, or coolant leaks, usually identified on the side of the engine.
- **Damaged Pistons, Rings, and/or Cylinders –** Exhibit rattling sounds, blue smoke coming from the exhaust, rough idle, or a failed emissions test.
- **Broken or worn Rods, Bearings, & Pins** – Cause tapping or ticking sounds, low oil pressure, metal shavings found in engine oil, or rattling upon acceleration.

Car engines may seem complicated, but their task is simple: to propel your vehicle forward. With so many components working together to create this

motion, it's imperative your vehicle receives proper maintenance to ensure its longevity.

Regularly scheduled oil changes, fluid flushes, and changing belts and hoses at the recommended time is a great way to help prevent the unfortunate circumstance of a failed engine.

32. **Injector/Carburetor**: This is a device in a vehicle that helps in transmission of fuel to the engine. The carburetor or injector performs the function of regulating the amounts of fuels mixed with air that goes into the engine.

Functions of a carburetor:
The main functions of a carburetor are

1. The main function of carburetors to mix air and gasoline and provides a high combustion mixture.
2. It controls the engine speed.
3. It also regulates the air-fuel ratio.
4. Increase or decrease the amount of mixture according to the engine speed and load changing.
5. To keep certain head of fuel in the float chamber all the time.
6. Vaporize the fuel and mix to air to a homogeneous air-fuel mixture.
7. To supply the correct amount of air-fuel mixture at the correct strength under all conditions of load and speed of the engine.

Advantages of the carburetor:

1. Carburetor parts are not as expensive as that of fuel injectors.
2. With the use of a carburetor, you get more air and fuel mixture.
3. In terms of a road test, carburetors have more power and precision.
4. Carburetors are not restricted by the amount of gas pumped from the fuel tank which means that cylinders may pull more fuel through the carburetor that would lead to the denser mixture in the chamber and greater power as well.

Disadvantages of the carburetor:

1. At very low speed, the mixture supplied by a carburetor is so weak that, it will not ignite properly and for its enrichment, at such conditions, some arrangement in the carburetor is required.
2. The working of a carburetor is affected by changes in atmospheric pressure.
3. More fuels are consumed since carburetors are heavier than fuel injectors.
4. More air emissions than fuel injectors.
5. The maintenance costs of a carburetor are higher than the fuel injection system.

Applications of Carburetor:

- Used for Spark-Ignition Engine.
- It used to control the speed of the vehicles.
- It converts the main fuel petrol into fine droplets and mixes with air to burn in smoothly and properly without any problem.

VEHICLE INJECTOR

There is a fuel injector fitted in most vehicles. The main job of injector is to supply fuel to the engine. However, just like any other machinery, a fuel injector can start malfunctioning at any time. It can either cease to spray fuel to the engine or the interval of spraying could be messed up by chance.

How do Fuel Injectors Work?

Before we talk about its functionality, let us first learn about the brief definition of a car Fuel Injector. It is basically an electronically controlled mechanical device that is responsible for spraying, or in other terms, we can call it 'injecting' the appropriate amount of fuel into the engine.

The right amount of fuel injection ensures the thorough mixture of air and the fuel, leading to complete combustion without any residue left behind due to partial combustion. This mechanism was initially implemented only in diesel engines, however at present, it seems to be popular among regular gasoline engines as well.

Coming to the functioning, the ECU or the Electronic control unit collects information from various engine sensors and determines the precise amount of diesel or gasoline to be released and the perfect timing of the fuel injector coil.

This ensures the correct dosage at the right time. The basic purpose of a fuel injector is to spray the fuel in a mist or an atomized form. This ensures uniform burning of the fuel. The injector comprises of an inlet port through which the Fuel Injector Pump, commonly abbreviated as FIP supplies pressurized diesel.

There is a spring present inside the conventional injector that holds the needle valve in a closed position. It keeps holding the needle valve until the high pressure lines meet a specific value.

What are the bad Fuel Injectors Symptoms?
Your fuel injector can be dirty, clogged or faulty. Carbon particles, old fuel and accumulation of residue leads to clogged fuel injectors. The collection of debris in the filter basket prevents the fuel to flow through it.
The unburnt hydro carbons affect the fuel flow rates and atomization. To make the description compact, here I am going to list some of the commonly seen bad fuel injectors symptoms:

Poor performance of the vehicle
- Complications while starting the vehicle
- Fuel odours.
- Failed emission
- Engine fails to reach the full RPM
- Rough engine performance
- Oil thinning
- Pollution
- Smoke emission
- Increased fuel consumption
- Catastrophic engine failure

How to Prevent bad Fuel Injectors?
A regular maintenance is hardly advised. However, the parts of the vehicle must be inspected almost on a regular basis. Although the fuel injectors have got the finest tolerances, still a careful note of the components will prevent turning your head to troubles too often in the middle of the way or during emergencies.

Add moisture drawing ethanol or additives, conduct ultrasonic cleaning, visual supervision and actual flow pattern for volume and spray testing. This would produce a more reliable and guaranteed outcome.

33. **Air Filter:** A particular AIR FILTER is a device composed of fibrous materials which removes solid particulates such as dust, pollen, mould and bacteria from the air. Filters containing an absorbent or catalyst such as charcoal (carbon) may also remove odors and gaseous pollutants such as

voltage organs compounds or ozone. The air filters are used in applications where air quality is important notably in building ventilation system and in engines.

34. **Air Bag:** An Air Bag is a type of vehicle safety device and an occupant restraint system. The air bag module is designed to inflate extremely rapidly than quickly deflate during a collision or impact with a surface or a rapid sudden deceleration.

The purpose of the air bag is to provide the occupant a soft cushioning and restraint during a crash event to prevent any impact or impact – caused injuries between the flailing occupant and the interior of the vehicle.

35. **Alternator(Automotive)**: Alternators are used in modern automobiles to charge the battery and to power the electrical system when its engine is running. In the early days of modern cars, the gas used to charge the battery while today alternator or dynamo has taken its place. The alternator is connected to the engine through gear and when the engine runs, the alternator draws power from the engine which in turns generate electricity. Electricity keeps the battery charged and also fulfills the requirements of all the electrical components.

36. **Ammeter:** An ammeter (from Ampere meter) is a measuring instruments used to measure the current in a circuit.

37. **Braking System:** An anti-lock braking system or anti-shed braking system is an automobile safety system that allows the wheels on a motor vehicle to maintain reactive contact with the road surface to according to driver inputs while braking, prevent the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. It is an automated system that used the principles of threshold braking and cadences braking which where practiced by skilful drivers with previous generation braking system. It does this at a much drivers could manage.

38. **Battery:** An automatic battery is a rechargeable battery that supplies electrical energy to a motor vehicle. It is also known as an SLI BATTERY and its main purpose is to start the engine and keep it running, power for the car is supplied by the alternator. As well as starting the engine an SLI BATTERY suppliers the extra power necessary when the vehicles requirements exceed the supply from the charging system. Battery is the most essential **electric vehicle parts**. It transmits power to a self-starter to start the engine of a car. Besides, starting the engine of a car, the battery can also be used in place of the generator. For example, you can play the audio system in your car when the engine is off and at the same time, it supplies power to headlights and air-conditioning too. In fact, it is the backbone of the electrical system in a vehicle.

39. **Automotive Navigation System:** An automotive navigation system is part of the automobile controls or the third party adds on used to find direction in an automobile. It typically used the navigation device to get it position data which is then corrected to a position on a road.

40. **Beam Axle:** A Beam Axle or rigid axle or solid axle is a dependent suspension design, in which a set of wheels is connected laterally by a single beam or shaft. In most automobiles, beam axles have been replaced by front and rear independent suspensions.
41. **Bearing:** Is a machine element that constrains relative motion to only the desired motion, and reduced friction between moving parts. The design of the bearing may, for example provide for free linear movement of the moving part or for free rotation around a fixed axle, or it may prevent a motion by controlling the vectors normal surfaces that bear on the moving parts.
42. **Bumper:** A bumper is a structure altered to or integrated with the front and rear ends of motor vehicles to aborts impact in a minor collision, ideally minimizing repair costs. Bumper consists of plastic cover over a reinforcement bar made of steel. Aluminium, fibre glass composite or plastic. Bumper offer protection to other vehicle components by dissipating the kinetic energy generated by an impact.

Belt (Mechanical) A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently, or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys and the shafts to needs to be in parallel. In two parallel system, the belt can either drive the pulleys normally in one direction (the same if on parallel shafts) or the belt may be crossed, so that the direction of the drive shaft reserved (the opposite direction of the driver if on parallel shaft).
What is a drive belt?

A drive belt or serpentine belt is a single, continuous belt used automotive engines to rotate multiple peripheral devices in the engine. The belt is allowed to pass over more three pulleys which are designed to fitly enclose the belt to avoid slipping. Idler pulleys are pressed against the back of the belt, forcing it into the shape in the pulley.

A drive belt can last at least more than10,000 miles. Cranks or breaks can easily be detected as they can see on the side in front-wheel drive vehicles. in rear-wheel drive vehicles or cars with boxer engines, it‘s visible from the front. In some rear-wheel car sand older cars, the drive belt also drives the front engine fan. Some engine ensign uses two of them depending on the configuration and the device layout.

In some engine layout, the backside of the belt, which is smooth is used to drive some device. The design is typically limited to components with the need for less torque or where a large enclose angle is present

Functions of a drive belt

Below are the functions of a drive belt in an automotive engine:

- The primary purpose of a drive belt is to drive or power the engine accessories.
- Drive belt use one source of energy to power multiple components
- It increases the mechanical efficiency of the engine.
- Since the engine water pump is powered by a drive belt, it will stop running and cause overheating if it breaks.
- Also, the hydraulic power steering is drive by the belt. So, steering assist will be lost as the power steering pump is disabled form the drive.
- The alternator that also supplies electrical power will stop working as the device is disabled

43. **Camshaft:** A camshaft is a shaft to which a cam is fastened or of which a cam forms an integral part. The camshaft is used to operate poppet valves.

44. **Car Controls:** Car controls are the components in automobiles and other powered road vehicles such as trucks and buses used for driving and packing. While controls is like steering wheels and pedals . The following make up the car control; the pedals ,the steering, the mirrors and gear selectors.

45. **Car Glass:** Car Glass includes wheel screen side and rear windows and glass panel roofs on a vehicle. Side's windows can either be fixed or be raised and lowered by depressing a button (power window) or switch or using a hand-turned crate. The window shield of a car is appropriate for safety and protection of debris in the road, it also comfort the drivers as well.

46. **Car Seat:** A car seat is used in automobile. Most car seat are made from inexpensive but durable material in other to withstand prolong use.

47. **Catalytic Converter:** Is an emission control devices that converts toxic gas and pollutants in exhaust gas to less toxic pollutant by catalyzing a reaction. Catalytic converters are used with internal combustion engines fuelled by either petrol or diesel. It helps in less fuel consumption.

48. **Center Console:** Center console in an automobile refers to the control bearing surfaces in the center of the front. The term is applied to the area beginning with the dashboard and continuing beneath it, and often margin with the transmission which runs between the front drivers and passengers

seat of many vehicles. A center console includes a wild variety of storage compartment and cup holders, some of them with refrigerant.

49. **Clutch:** A clutch is a mechanical device which engages and disengages power transmission especially from driving shaft to driving shaft. Clutches connect and disconnect two rotating shafts (drive shaft or line shafts). In these devices, one shaft is typically attached to an engine or other power unit. (the driving member) while the other shaft (the driven member) provides output power for work.

50. **Connecting Rod:** In a reciprocating piston engine, the connecting rod or conrod connects the piston to the crank or crankshaft. Together with the crank, they form a simple mechanism that converts reciprocating motion into rotating motion.

51. **Control Arm:** A control Arm is also known as an A-arm, is hanged suspension leak between the chassis and suspension upright or hub that carries the wheel.

52. **Crankshaft:** A Crankshaft related to crank is a mechanical part able to perform a conversion between reciprocating engine, it translates reciprocating motion of the piston into rotational motion. Whereas in reciprocating compressor, it converts the rotational motion into reciprocating. In order to do the conversion between two motions, the crankshaft has "cranks throws" or "Crankpins", additional bearing surface whose axis is offset from that of the crank, to which the big ends of the connecting rods from each cylinder attach.

53. **Dashboard:** A dashboard is also called fascia. Is a control panel located directly ahead of a vehicle driver, displaying instrumentation and controls for vehicle's operation.

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Exhaust System: It is usually piping used guide reaction exhaust gases away from a controlled combustion inside an engine. The entire system conveys burnt gases from the engine and includes one or more exhaust pipes.

54. **Fuel Gage:** Is an instrument used to indicate the level of fuel contained in a tank. Commonly used in most motor vehicle.

55. **Gear Stick:** This is a metal lever attached to the shift assembles in a manual transmission equipped automobile and is used to change gears. In an automatic transmission vehicle, a similar gear device is known as a gear selector.

34. **Odometer:** This is an instrument used in measuring the distance travelled by a vehicle such as bicycle or automobile. This device may be mechanical, electronic or a combination of two.

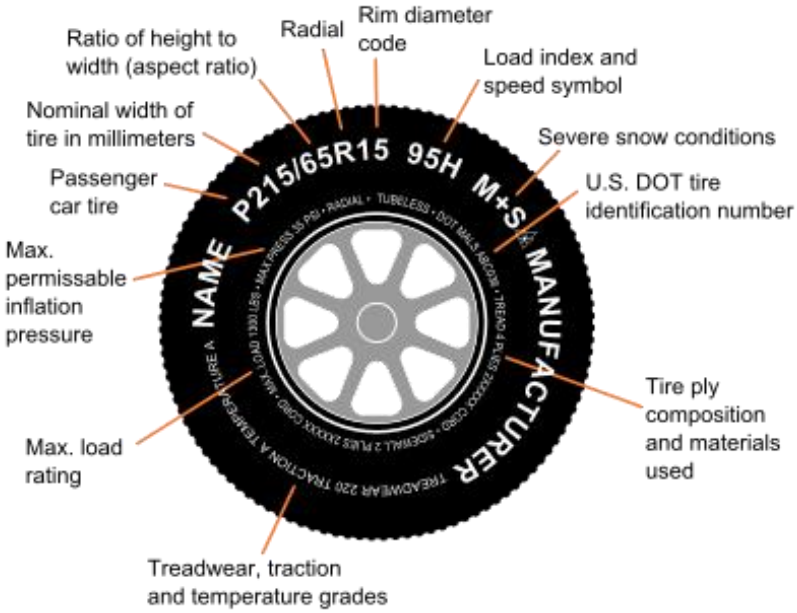
35. **Oil Filter:** This is designed to remove contaminates from engine oil, transmission oil, lubricating oil or hydraulic oil. Oil filters are used in filtering partreles.

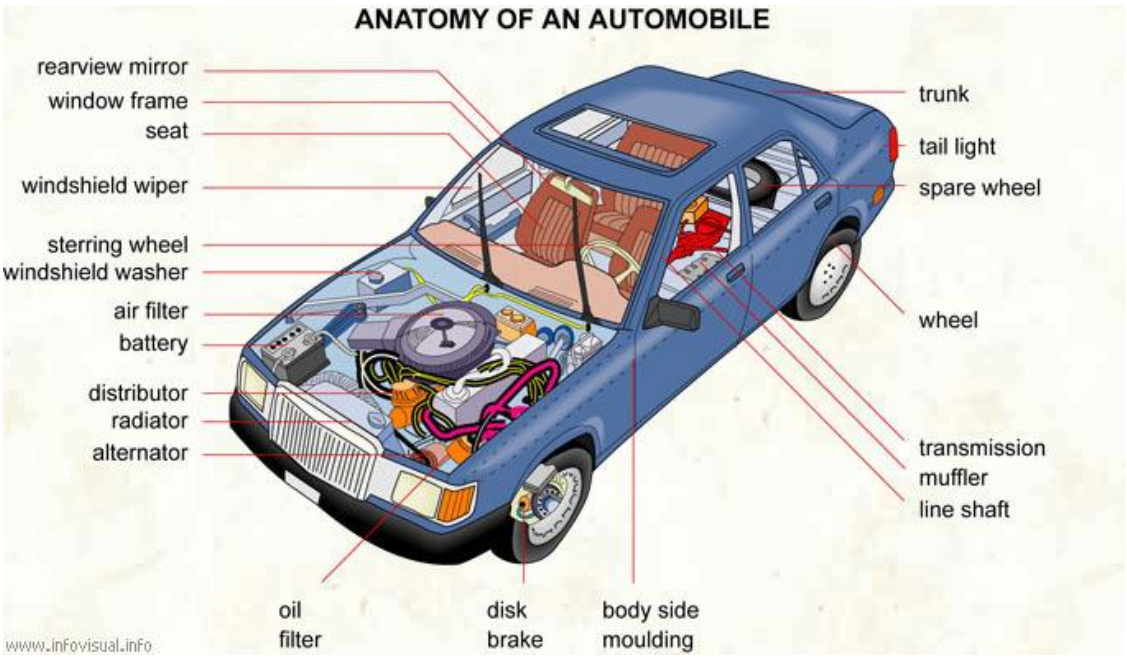
36. **Parking Brake:** This is also called the hand brake, is a latching brake usually used to keep the vehicle stationary. It is sometimes also used to prevent a vehicle form rolling when the operator meets both feet to operate the clutch and the throttles pedals.

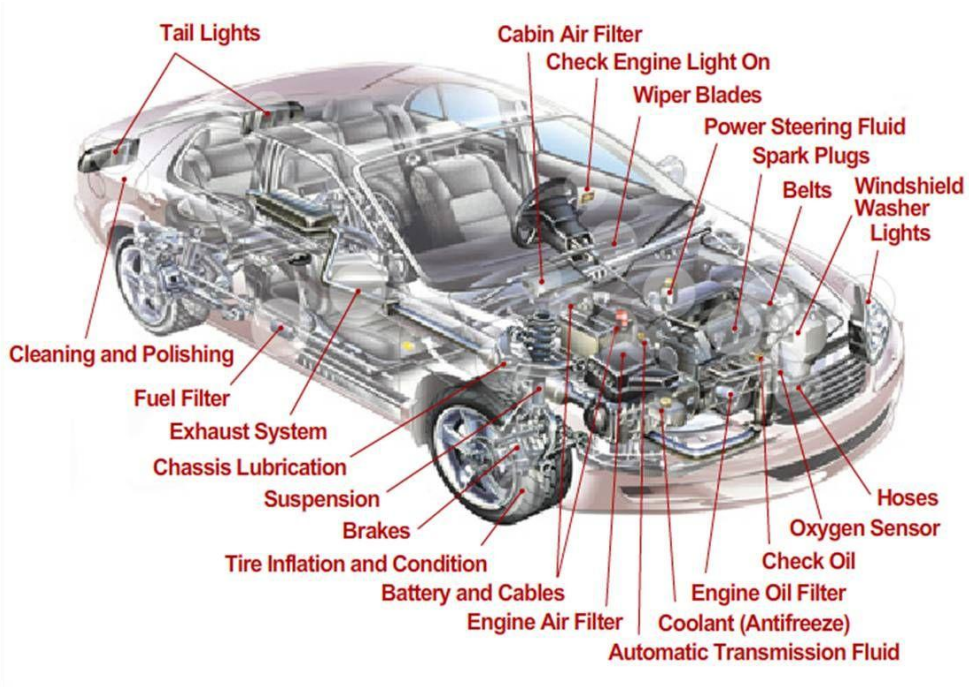
37. **Seat Belt:** It is also known as a safety belt, is vehicles safety device designed to secure the occupants of a vehicle against harmful movement that may result during a collision or sudden stop.

38. **Steering Wheel:** This is a type of steering controls in vehicles vessels (ships and boats) steering wheels are used in most Modern land vehicles, including all mass production automobile as well as buses, light and heavy trucks, and tractors.

39. **Tire:** This ring shaped vehicle component that covers the wheel's rim to protect it and enable better vehicle performance. Most tires such as those for automobile and bicycles, provide traction between the vehicle and the road while performing a flexible cushion that absorbs shock.







40. **Trunk:** This trunk or boot of a car is the vehicle's main storage compartment. The trunk or luggage compartment is most often located at the rear of the vehicle.

41. **Horn:** Is a sounding making device that can be equipped to motor vehicles, buses, bicycles, trains, trans. The sound made usually reassembles a "horn" the vehicle operator uses it to warn others of vehicles approach or presence or to call attention to some hazard.

42. **Oils:** This is a liquid that help in lubricating different part of vehicle for smooth running. The oil performs the function of removing carbon monoxide, lubricating, and reduction of excessive heat from the engine. The oils must be check regularly to avoid knocking of the engine. It must also be change at regular interval.

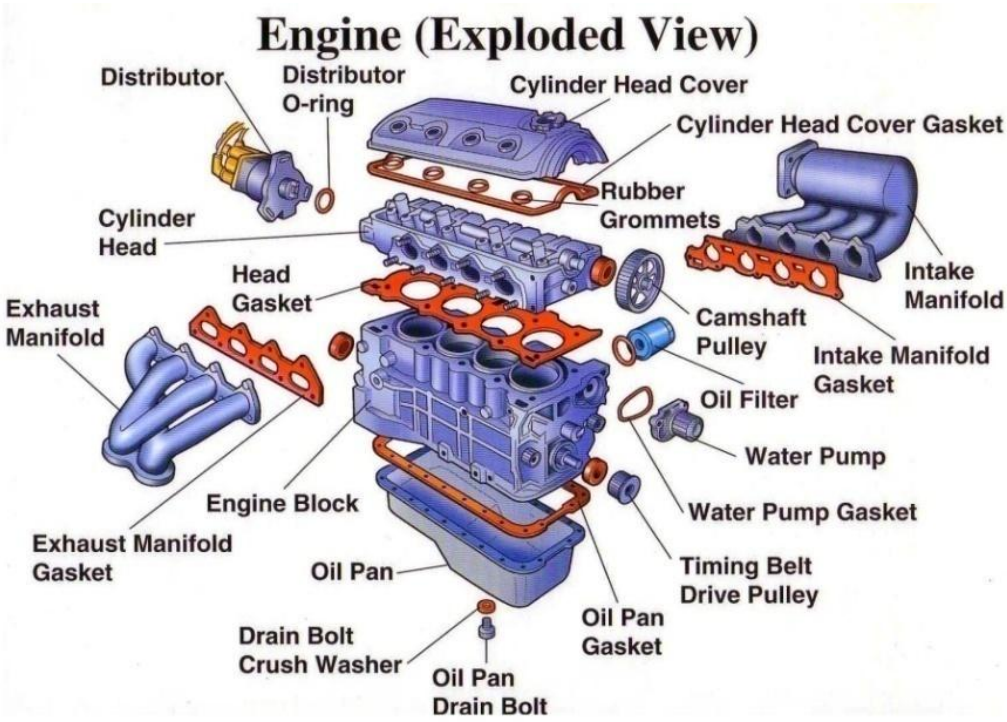
WHAT TO DO IN MANUAL TRANSMISSION

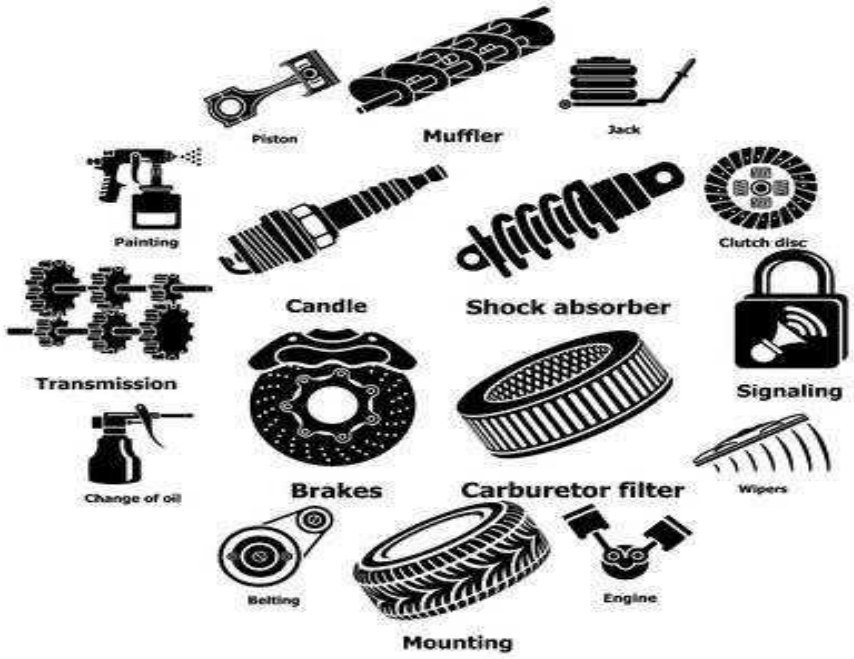
1. Always use clutch when changing gears in manual.
2. Slowly engage and disengage the clutch
3. When stopping clutch and brake should be use
4. Whenever you intend to change gear, your clutch must be depress fully.
5. Whenever you notice that your gear selector is becoming strong, check your gear oil.
6. Don't always put your leg on clutch pedal while vehicle is in motion.

WHAT TO DO IN AUTOMATIC TRANSMISSION

1. Always depress the brake before engaging any gear.
2. Gently press the accelerator pedals to move the vehicle

3. Neutralise your gear whenever the vehicle is idling.
4. Use parking when you are about leaving the car.
5. Check/change your gear box oil when necessary for activeness of your car.





CHAPTER 4

DEFENSIVE DRIVING TECHNIQUES (DDT)

In this topic, we shall be looking at the following objectives:

1) Meaning of Defensive Driving
2) Attribute of Defensive Driver
3) Qualities of Defensive Driver
4) Element of Defensive Driver
5) Responsibilities of a Driver
6) Drivers Psychology
7) Function of a driver behind the steering wheel
8) Meaning and Rules of Overtaking
9) Following Distance
10) Stopping distance
11) Breaking
12) Reversing
13) Uses of Mirror
14) Uses of the Horn
15) The lighting system
16) The Steering
17) Hazard Perception
18) Parking

DEFENSIVE DRIVING TECHNIQUES

Defensive driving can be defined as a form of training for a motor vehicle operators that goes beyond mastery of the rules of the road and the basic mechanisms of driving. It's also a kind of driving to save life, time and property. The aims is reducing the risk of driving by anticipating dangerous situations, and adverse conditions or the mistake of others.

ATTRIBUTE OF DEFENSIVE DRIVING

1). Concentration
2). Anticipation
3). Alertness
4). Good knowledge of traffic rules and regulations, road signs and markings.

OTHER QUALITIES OF A DEFENSIVE DRIVER

1)	SKILL	-	A good defensive driver must be legally licenced to drive.
2).	KNOWLEDGEABLE	-	A good defensive driver should or must be well informed.
3).	ALTERNATIVE BEARING	-	A good defensive driver should be watchful for dangers.
4).	JUDGMENTAL	-	A good defensive driver should judge before doing anything.
5).	CAREFULNESS	-	A good defensive driver should be very careful.
6).	COURTESY	-	A good defensive driver should be courteous to other road.

ELEMENTS OF DEFENSIVE DRIVING

1). Recognise that there are dangers on the road and address them accordingly.
2). Understand your defensive skills
3). Make correction of your act when necessary
4). Act immediately without delay
5). Always avoid panics.

RESPONSIBILITIES OF A DRIVER

1). He must be able to do the vehicle routine checks
2). Road safety consciousness
3). Must be able to report road traffic crash
4). Journey records

5). Must observe defensive driving techniques always
6). Neat and neatly dressed
7). Cost and time conscious
8). Able to communicate effectively
9). Must have basic knowledge of auto mechanics.

DRIVERS PSYCHOLOGY

Psychology can be defined broadly as the science or study of the mind and how it functions. It can also be looked at as characteristics of a person or group of people in relation to their behavioural tendencies.

The average professional drivers deceives himself into believing that due to his long years in the profession, he has mastered all the (RAIDS) act of driving also suffer the same delusion as the professional counterpart, non – professional drivers in his skills, that he ignores other variable that often come to play in the traffic environment.

ROAD ACCIDENT IMMUNITY DELUSION SYNDROME (RAIDS) is however more common in youths than in adults drivers. Most drivers are enveloped with defiant behaviour because of this belief.

THE FOLLOWING ARE SOME CONTRIBUTING FACTORS TO HUMAN BEHAVIOUR

- Discipline
- Loyalty
- Honesty
- Tidiness
- Courtesy
- Courage.

FUNCTION OF A DRIVER BEHIND STEERING WHEELS

- SIPDE system
- Search
- Identify relevant area
- Predict
- Decide
- Execute your decisions.

SMITH SYSTEM: The system specifies the following for drivers:

a). Aim high and look ahead, not down
b). Keep your eyes moving
c). Get the big picture
d). Make sure others see you and you see others

e). Leave yourself a way out or a margin of safety.

MEANING OF OVERTAKING AND RULES INVOLVES

Overtaking is the process of driving fast slow vehicle or stationary objects.

Do not overtake at:

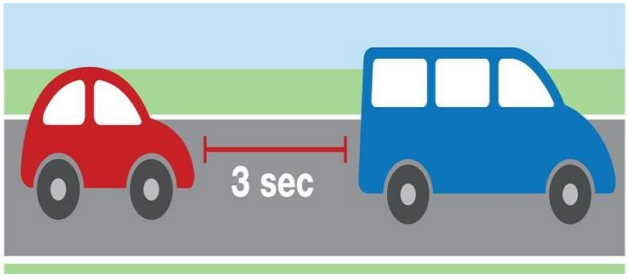
1). You must be careful and vigilant when overtaking.
2). Once you have started to overtake, move pass the vehicle you are overtaking as quickly as possible.
3). Move back to the right side of the road as soon as you can
4). You should always overtake on the left side, so that the driver can see you clearly.
5). When you are planning to overtake, you must make sure that you have plenty of time to complete the manoeuvre
6). When overtaking, check your mirror, to be sure that nobody is overtaking you.
7). When you have make your pass, keep a good distance from the vehicle you have overtaking.
8). Take particular care when overtaking at night it can be difficult to tell or judge rightly.
9). Do not overtake if you cannot see far enough or ahead of the vehicle you wish to overtake.
10). Its a dangerous thing to overtake so many vehicle at the same time.
11). Double solid white line along the road.
12). If the solid line of the center line is nearer to you.
13). When you see a "NO OVERTAKING" sign.

But ask yourself these questions when you want to overtake:

1). Is it safe?
2). Is it legal?
3). Is it necessary?

FOLLOWING DISTANCE: The space you allow in between your vehicle and the vehicle in front of you in a normal flowing traffic is known as following distance. The following distance you keep would determine the security of accidents in the event of a crash.

The Golden Rule is to give at least a two second distance and this is known as the two second rule. Also make sure you give a reasonable distance, while following another vehicle.



STOPPING DISTANCE: When you spot a danger on the road and you step on your brake pedals, the vehicle would not come to a halt immediately the space in between where you stepped on your brakes and where the vehicle comes to a halt is known as stopping distance. One of the ability of a good driver is the ability to measure what your stopping distance would be. The time that it takes to bring a moving car to a complete stop. The time it take you to react to hazard

1). Driver's physical fitness
2). Road Conditions
3). Tyres
4). Brakes
5). Weight of loads
6). Weather.

While tired drivers, wet roads, worm out tires, faulty brakes and over loading are some causes of longer stopping distance on our roads.

BREAKING: Never get too close to the vehicle in front. When it is safe to slow down, brake smoothly and in controlled manner by applying gently and sustained pressure on the brake pedal, then remove the gear to neutral, sudden braking can result to loss of control. Braking distance is the distance the car travels, coming to a stop, once the brake have been applied.

REVERSING: This means driving the vehicle backward, great care and practice is needed, to develop the necessary skill for reversing.

In reversing, the clutch, pedal is not fully released while the accelerator is gently pressed until you finish the task. Remember reversing is only for short distance.

BEFORE REVERSING:

1). Make sure there are no pedestrians, particularly children or physical obstruction on the road behind.
2). Be particular careful about the blind area or spots.
3). If cannot see clearly get someone to guide you, otherwise don't reverse.

4). Never reserve from side roads into a major road.
5). At night when reversing, always put off your headlights, ensure that your reverse light is working.

USESOFMIRROR

These are mirrors positioned at the front side of the vehicle and inside the vehicle which enables the drivers to see what is happening behind him without turning back or sideways. It is used to ensure that the road is clear before he changes lane, stops, makes a U-turn, slows down, overtake another vehicle, pull out of a parking space or reverse, a vehicle may have two or more rear mirrors, could be adjusted manually or mechanically as the case may be. In today's era, mirror plays a critical role in the safe driving by a vehicle.

Therefore, on seeing its importance, many car firms have integrated the mirror as an electronic component in the car. However, there are still ample of vehicles in the market, which requires manual adjustment of it. To add on to the safety of your vehicle, let us learn certain vital tips for **using mirrors while driving.**

Type of Mirrors in a Car

People daily commute to their places safely without being aware of the type of mirrors, they are using while driving. These different types of mirrors are side-view, rear-view, and the mirror in headlights of a car.

1. Headlight Mirror

This concave mirror covering the headlights is widely used during the night or, extreme weather conditions like on a foggy or rainy day. With its property of light divergence, it allows the driver to get the maximum visibility of the area in front.

2. Side View Mirror

Mounted on both the front car doors, these reflectors use the convex lens to minimize the size of the objects. In fact, these convex mirrors have the attribute to show large area by making the size of objects small. Thus, the surrounding objects appear to be smaller and farther than they actually are.

It assists by providing the side and far behind view of the vehicle. Moreover, the person gets the peripheral vision of the objects from the driver‘s seat. That is why for safety reasons it is always mentioned on the mirror-Objects in the mirror are closer than they appear.

3. Rear View Mirror

Attached inside the car, this concave mirror is attached to the windshield. It‘s mainly responsible for showing the immediate back view of the vehicle.

1. Moving from a Stationary State

An appropriate and safe observation before driving off really helps a lot in controlling the car. Moreover, the accuracy saves the vehicle from any severe damage or, as light bend.

Therefore, before moving, one must always check the view in right door mirror, followed by the rear reflector. Then, look for the right blind spot area, and next, again in the right mirror. If everything is clear, then drive away the car.

2. Speed Adjustment

Before accelerating the speed of the vehicle, it is wise to check the side mirrors as there maybe another vehicle trying to overtake you. Similarly, while slowing down the car, always confirm the speed of behind vehicle from the rear-view mirror. Otherwise, due to this minor negligence, the vehicle behind your car won‘t get the time to react.

Direction Change or, Overtaking

Mirrors need to be checked before changing the lane or, trying to overtake the vehicle. In such cases, the blind spot and the appropriate reflectors must be accessed first, in order to ensure that there is no vehicle on the side.

4. Giving Signals

Majorly confusion or, accidents occur when before signaling, the mirrors are not checked for the upcoming vehicle. Hence, it is equally important to check the side mirrors and make your decision accordingly for a turn.

5. Opening Car Doors

It might not sound important but assess the side and rear view mirror in the congested area. As it not only prevents the vehicle from any damage but also the person who may be coming by any vehicle or on foot from behind.

6. Safe Distance from another Vehicle

Safety experts usually recommend checking the side mirrors while driving. The essential thing to look while driving a car is the distance of your vehicle from the others. So, those who wish for a safe and enjoyable ride must maintain a proper distance by **using mirrors while driving**.

7. Driving with Trailer

Always watch the mirror, while pulling the trailer. Checking the rear and both the side view mirror is essential in this case, to avoid the hitting of the trailer‘s wheel with another vehicle

THE LIGHTS SYSTEM: These are the eye of the driver in darkness and a warning sign to other road users that a vehicle is on the road, without lights driving at night will be impossible. The lights in a vehicle must be kept in good condition always.

1). **The Brake – Light:** is used to alert the vehicle behind that you are slowing down or stopping completely. It is always red in colour.

2). **The Reverse Light:** Illuminates the rear for the driver a better view at night during reversing. Like the brake lights, it is connected to the reverse gear and functions only when the reverse gear is engaged. Its white in colour.

3). **Parking Lights:** As the name suggests, is used particularly at night when a vehicle is parked momentarily. It is used to draw attention to the parked vehicle so that no other vehicle, motorcycles, bicycle or even humans run into it.

4). **The Trafficator:** These are used to indicate the direction a vehicle intends to go. Trafficator are fixed in the front sides and rear sides of a vehicle, they warn other drive, of the direction you are about to go either left, right or of a change from one lane to another. Trafficator lights must be flashed in good time as a safety precaution.

STEERING

You need to be able to move your hand freely around the steering wheel. Place both hands at the top of the steering and you should have a slight bend in your elbows.

TYPES OF CONTROL

These are two main types of control which are:

1). Steering wheels
2). The Pedals.

STEERING CONTROL

The steering is a very important part of the vehicle which controls the movement of the vehicle, thereby determining the direction of the vehicle. It is connected through the steering columns and box to the wheels.

Proper method of handling steering

WHEN DRIVING

1). You should hold the steering wheel firmly but not too tightly.
2). Place both hands correctly on the wheel at the appropriate position, unless you are changing gear or working on another control with one hand.
3). Avoid resting your arm on the door.

HAZARD PERCEPTION

This is the ability a driver to see hazard and plan for them; it also means how a driver perceives dangers on the roads. A hazard is described as anything that may cause a driver to change speed, direction, stop, or even cause harm.

On the roads we have so many dangers that require carefulness in other to drive defensively. This hazard includes:

1). Potholes
2). Bumps
3). Sharp bend
4). Hills
5). Slope etc.

Also on the road there are two zones, planning zone and action zone.
The Planning Zone is at the point where driver sight hazard and begin to make plan on what to do. For example the driver that sight a pothole ahead of him he begins to make plans with his control such as the brakes, cutch and other devices in other gently move out of the potholes.

The Action Zone is the point at which the driver takes a major decision on how he will take care of the potholes so as to avoid accidents. In between the planning zone and the action zone is what will call escape route.

PARKING: In parking a vehicle, the brake and clutch pedals are very essential. Apply gentle pressure on the brake pedals gradually reduce the speed of the

vehicle and when the engine is about to stall, immediately depress the clutch pedal to disengage the power from the engine to the transmission this will bring the vehicle to a final stop without causing the engine to stall.

THREE BASIC MODES OF PARKING ARE:

1) **Parallel:** This is arrangement of cars in a line, with the front bumper of one facing the back bumper of an adjacent one.

2) **Perpendicular:** This is the arrangement of cars side to side, perpendicular to an aisle, curb or wall.

3) **Angular:** In this case, vehicles are designed to go one way in form of angle. It is always marked on the ground for motorist.

SAFETY TIPS TO BE CONSIDERED WHEN PREPARING TO PARK

1). Trafficate to the side you wish to park.
2). Slow down and look through side mirror and interior rear view mirror.
3). If no vehicle is coming from the opposition direct turn.
4). Stop the vehicle to observe the surrounding.
5). Park appropriately and gently
6). Do not obstruct traffic flow.
7). Do not block other vehicles that are parked.

CHAPTER 5

LICENSING OF VEHICLE AND DRIVERS

In this topic, we shall be looking at the following objectives:

1) Meaning of Learner's Permit
2) Uses of Learner's Permit
3) Uses of Driver's License
4) Categories of Driver's License
5) Process of Obtaining Driver's License
6) Renewal of Driver's License
7) Replacement Driver's License
8) Vehicle Identification (Number Plate)
9) Vehicle Documentation
10) Proof of Ownership Certificate (POC)

LICENSING OF DRIVERS AND VEHICLES.

MEANING OF LEARNER'S PERMIT:

Learners permit is a document which entitles a learner driver to drive a car on the road under the supervision of a qualified and licensed driver.

It is mandatory that the learner driver displays the "L" sign in front and rear of the vehicle.

USES OF LEARNER'S PERMIT

1. The holder must be 18 and above
2. The holder must always go with an instructor
3. He or she must attach learner's sign "L"
4. He or she is not permitted to drive inter-cities but only intra-cities
5. The holder is not permitted to drive on major highways or express road.
6. The first learners permit insurance is valid for 3 months. While the second one is six months as case may be.
7. Learner not allow to drive beyond 6pm in the evening.
8. Passagers are not allowed in the vehicle.
9. It help the learner when crashes occurs while learning.

MEANING OF A DRIVER'S LICENSE

A Driver's license can be define as any legal document that confirms on a person the right to drive a motor vehicle.

USES OF DRIVER'S LICENCES

1. The holder must be 18 and above for private applicants and 26 and above for commercial applicants.
2. The holder is allowed to drive without a supervisor
3. The maximum age for driver's licence is 70 years.
4. It helps in case of Road Traffic Crash (RTC).

CATEGORIES OF DRIVER'S LICENCE

The Nigeria driver's license is categorised into the following ten classes:

A: Motorcycle

B: Motor vehicle of less than 3 ton gross weight other than motorcycle, taxi, stage carriage or omnibus.

C: A motor vehicle of less than 3 ton gross weight other than motorcycle.

D: Motor vehicle other than motorcycle, taxi, stage carriage or omini bus excluding articulated vehicle or vehicle drawing a trailer.
E: Motor vehicle other than a motorcycle or articulated vehicle.
F: Articulated vehicles
G: Earth moving vehicles
H: Special, for physically challenged persons.
I: Convoy driving (person's engaged in driving senior government or political office holders).

PROCESS OF OBTAINING DRIVER'S LICENSE

These are various stages for issuance of drivers license applicant must:

1. The applicant must have fulfilled training in a driving school and obtain a proficiency certificate.
2. Then the applicant then proceeds to the Vehicle Inspection Office/Road Traffic Office (VIO/RTO) where a driving test is conducted and a certificate of proficiency for the new license is issued.
3. The applicant proceeds to a designated bank and pays the prescribed fee after which the complete forms and evidence of payment are presented to the (BIR) for endorsement and issuance of receipt, where applicable.
4. The applicant proceeds to FRSC Driver's License Centre (DLC) for capturing of biometric data (portrait, fingerprint and signature).
5. A temporary license is issued by FRSC to the applicant, which will be valid for sixty days.
6. The FRSC procedures and sends the final license to the BIR for issuance to the applicant.

RENEWAL OF DRIVER'S LICENSE

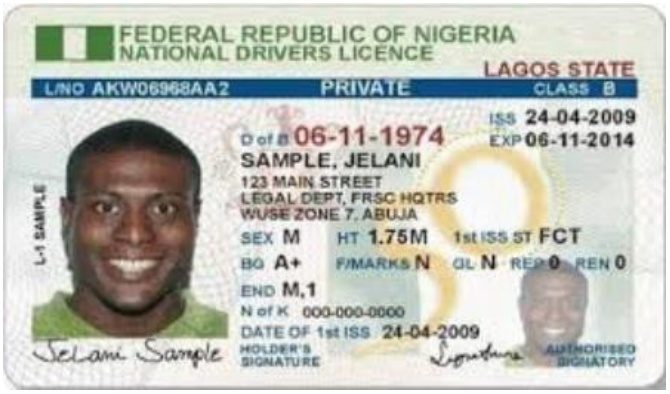
The driver's license expires three (3) or five (5) years after the date of issuance. The procedure for the renewal is the same as obtaining a fresh driver's license expect that the applicant needs not to go to the driving school VIO for testing if it is still within three (3) months after expiration of driver's license.

REPLACEMENT DRIVER'S LICENSE

Replacement is done when the driver's license is defaced, misplaced or lost here, the applicant must do the following:

1. Swear to an affidavit of loss or damaged of license.
2. Obtain a Police Extract
3. Process the application online and print out the form
4. Pay the prescribed fee at a designated bank

5. The online driver's license process is then activated and the applicant goes through the remaining process for re-issue.



VEHICLE IDENTIFICATION (NUMBER PLATE)

The overt description of a vehicle is the Number Plate. The Number plate is made of aluminium substrate cut into appropriate sizes.

The two number plates are displayed one in front and the other one at rear of the motor vehicle, for articulated vehicles, three number plates are required, one on the front side, second on the vehicle drawing the trailer and the last one on the rear of the carriage.

Each vehicle category has a district colour as follows:

1. Private - Blue on white background
2. Commercial - Red on white background
3. Para-military - Black on white background
4. Government - Green on white background
5. Diplomat - White on red background or white on blue Background.

There are also types of Number Plates that can be identified. Out of series and fancy. Individuals can request for special number plates using their initials, nicknames, abbreviated to suit that purpose.

1. Decoding Nigeria plate number abbreviation

In every country around the world, you will find plate numbers on virtually every car, Nigeria is no exception. A plate number is one of the government's established means of identification of vehicles.

Obviously, a bulk of vehicles comes in the same model, color and features, so

distinguishing between them will be impossible.

There are different formations of number plates, depending on country preference. In Nigeria, the unique format is something like this:

ABC-123DE

The first three letters represent the Local Government Area where the vehicle was registered, then three digits and two other letters follow.

The two last letter codes are mainly for numbering. For example, the number series will go from 001AA to 999AA before moving onto 001AB to 999AB and so on. However, the former letter is used to distinguish types of vehicles in some cases. For instance, A means private vehicles, X means taxi and commercial transports, Q refers to bikes and tricycles and H is for hilux vans.

Generally, the license plates are white, while the plate number is imprinted in blue. You may have noticed other kinds of number plates, some in red and some in green.

A Lagos state platen umber

For commercial vehicles, the plate number is imprinted in red, government plates are in green, then diplomatic plates are imprinted in purple and green, with white lettering. For diplomatic plates, the first two or three digits indicate the country the car‘s owner represents, then two letters and numbers follow. On this exclusive plate, you‘ll find CORPS DIPLOMATIQUE, instead of the name of the state.

A plate number is one of government’s established means of identification of vehicles in Nigeria and other parts of the world; it is a glaring fact that vehicles at times come in the same model, colour and features, making it nearly impossible for people to distinguish between them.

The idea of vehicle plate number was conceived as a result of this development to enable people easily identify vehicles.

Nigeria presently adopted a brand of plate number which to a great extent has ameliorated fraudulent practices perpetuated by some corrupt vehicle licensing

officers; thereby enhancing the internally generated revenue of the federal government.

Plate numbers when procured authenticate one's ownership of the specified vehicle thereby making it easy for you to trace your vehicle in case of car theft.

Nigeria like other countries of the world has established procedure on how to register for vehicle plate number but still a lot of Nigerians due to ignorance of the process involved employ the services of agents most times at a very high cost to procure a registered plate number for their vehicle.

However, the established guidelines on how to register for vehicle plate number in Nigeria are as follows.

Online registration
Applicants desiring to obtain a registered vehicle plate number in Nigeria should go to the online website to supply the information as demanded on the online form.

The information will be documented and used for official purposes. After registration, print the completed form, attach other relevant documents and submit to the office of the State Board of Internal Revenue.

Pay for the plate number
Before submitting the documents, pay in the designated bank the amount of money required or the plate number registration.

Attach a photocopy of the payment teller with the document you intend to submit.

Submit the original teller if requested
Keep the photocopy or acknowledgment receipt with you as evidence of payment in case of an eventuality.

Some offices of Nigeria Board of Internal revenue do collect cash in the office in respect of the services. Find out if this is applicable to the Board of Internal revenue where you went for the services. **VIO Inspection**

Vehicle inspection officers are the organ in charge of confirmation of road worthiness of a vehicle.
The applicant at this stage takes the vehicle to vehicle Inspection Office (VIO) for physical confirmation.
The vehicle if confirmed will be issued a certificate of road worthiness which will be attached to the vehicle license.

Road Safety Confirmation
Here, the safety officers will confirm the documents issued such as driving license, insurance policy number, means of identification, proof of address and others.

After that, the officer in charge will issue an approval notice to the Board of Internal Revenue to enable them to facilitate processing and registration of the plate number.

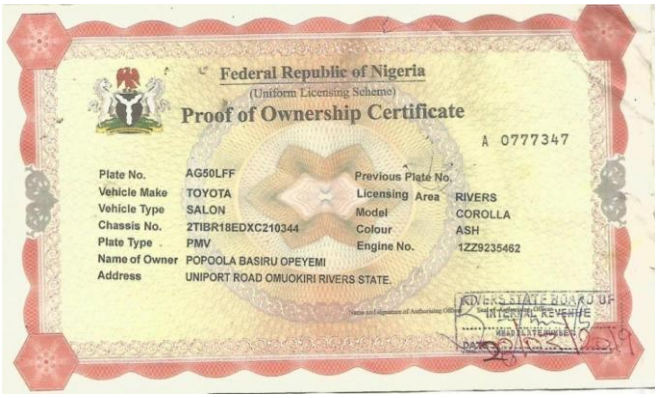
Collection of the vehicle plate number
Go back to the Board of Internal Revenue where you submitted your application and document to pick up the vehicle plate number.

VEHICLE DOCUMENTATION
Vehicle documentation is the process of acquiring all the necessary papers empowering the owner to use the vehicle on the highway after fulfilling all the statutory requirements as it relates to road taxes. It also includes the purchase receipt, freight papers, payment of custom duties and other ancillary fees.

Vehicle documentation includes the following:
1. Vehicle license
2. Insurance papers
3. Shipping documents
4. Custom clearance
5. Road worthiness
6. Hackney carriage
7. Stage carriage for buses and mini bus
8. Conductors badge
9. Prove of ownership
10. Change of ownership
11. Court affidavit.

1. **PROOF OF OWNERSHIP CERTIFICATE (POC)**
   The original copy of the POC contains the following security features:
   1. The security watermarked paper with 100% pure cotton rag content for durability.
   2. The design includes a bank-note type border printed in intaglio which cannot be replicated photographically and includes a latent image at each corner.
   3. Inside the border is printed a rain bowed anti-photographic anti-colour copier and anti-scan background.
   4. Metallic silver printing on both left and right hand sides of the certificates.
   5. Is done in triplicate by the various states MLA and issued as follows:

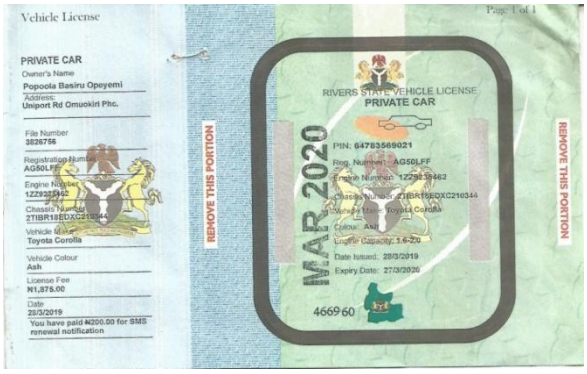
(a) Original vehicle owner.
(b) Duplicate - FRSC
(c) Triplicate - Retained by the MLA



Federal Republic of Nigeria
(Uniform Licensing Scheme)
Proof of Ownership Certificate
A 0777347

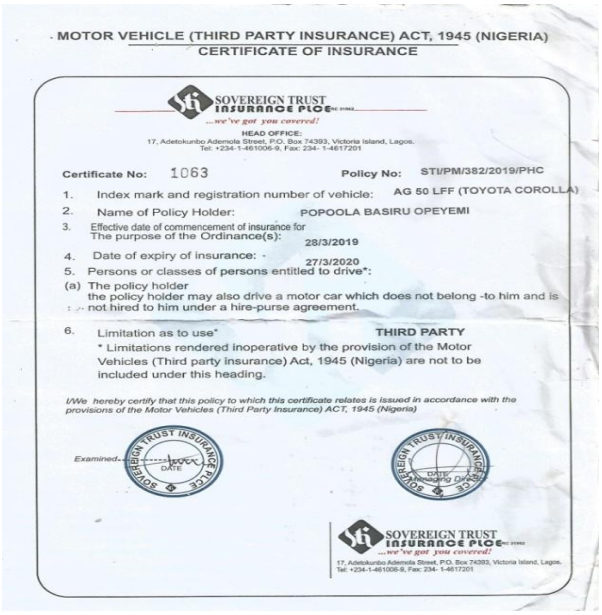
Plate No.	AG50LFF	Previous Plate No.	
Vehicle Make	TOYOTA	Licensing Area	RIVERS
Vehicle Type	SALON	Model	COROLLA
Chassis No.	2TIBR18EDXC210344	Colour	ASH
Plate Type	PMV	Engine No.	1ZZ9235462
Name of Owner	POPOOLA BASIRU OPEYEMI		
Address	UNIPORT ROAD OMUOKIRI RIVERS STATE.		

2. **VEHICLE LICENSE**: The vehicle license shows that a physical inspection has been carried out by the MLA to ascertain engine number, chassis number, vehicle make and colour. The vehicle license proforma would show the registration class of the vehicle, namely: private, commercial, articulated.



Vehicle License
PRIVATE CAR
Owner's Name
Popoola Basiru Opeyemi
Address:
Uniport Rd Omuokiri Phc.
File Number
3826756
Registration Number
AG50LFF
Engine Number
1ZZ9235462
Chassis Number
2TIBR18EDXC210344
Vehicle Make
Toyota Corolla
Vehicle Colour
Ash
License Fee
N1,875.00
Date
28/3/2019
You have paid ₦200.00 for SMS renewal notification
REMOVE THIS PORTION
RIVERS STATE VEHICLE LICENSE
PRIVATE CAR
PIN: 64783569021
Reg. Number: AG50LFF
Engine Number: 1ZZ9235462
Chassis Number: 2TIBR18EDXC210344
Vehicle Make: Toyota Corolla
Colour: Ash
Engine Capacity: 1.6-2.0
Date Issued: 28/3/2019
Expiry Date: 27/3/2020
MAR 2020
4669 60
REMOVE THIS PORTION

3. **INSURANCE CERTIFICATE:** It is compulsory for every vehicle owner to carry a valid insurance certificate. Motor Vehicle Insurance is intended to protect other motorist from liabilities a Crising from road traffic accidents.



MOTOR VEHICLE (THIRD PARTY INSURANCE) ACT, 1945 (NIGERIA)
CERTIFICATE OF INSURANCE

SOVEREIGN TRUST INSURANCE PLC
...we've got you covered!
HEAD OFFICE:
17, Adetokunbo Ademola Street, P.O. Box 74393, Victoria Island, Lagos.
Tel: +234-1-461006-9, Fax: 234- 1-4617201

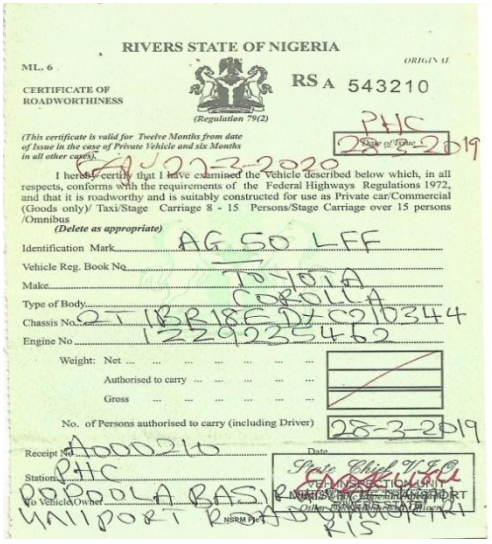
Certificate No: 1063 Policy No: STI/PM/382/2019/PHC

1. Index mark and registration number of vehicle: AG 50 LFF (TOYOTA COROLLA)
2. Name of Policy Holder: POPOOLA BASIRU OPEYEMI
3. Effective date of commencement of insurance for The purpose of the Ordinance(s): 28/3/2019
4. Date of expiry of insurance: - 27/3/2020
5. Persons or classes of persons entitled to drive*:
(a) The policy holder
the policy holder may also drive a motor car which does not belong -to him and is not hired to him under a hire-purse agreement.
6. Limitation as to use* THIRD PARTY
* Limitations rendered inoperative by the provision of the Motor Vehicles (Third party insurance) Act, 1945 (Nigeria) are not to be included under this heading.

I/We hereby certify that this policy to which this certificate relates is issued in accordance with the provisions of the Motor Vehicles (Third Party Insurance) ACT, 1945 (Nigeria)

Examined DATE
SOVEREIGN TRUST INSURANCE PLC
DATE

4. **ROAD WORTHINESS CERTIFICATE:** This certificate is issued by Vehicle Inspection Unit (VIO) as evidence that inspection have been carried out on your vehicle.



RIVERS STATE OF NIGERIA

ML. 6 ORIGINAL

CERTIFICATE OF ROADWORTHINESS

RS A 543210

(Regulation 79(2))

PHC

(This certificate is valid for Twelve Months from date of Issue in the case of Private Vehicle and six Months in all other cases).

22-3-2019 to 22-3-2020

I hereby certify that I have examined the Vehicle described below which, in all respects, conforms with the requirements of the Federal Highways Regulations 1972, and that it is roadworthy and is suitably constructed for use as Private car/Commercial (Goods only)/ Taxi/Stage Carriage 8 - 15 Persons/Stage Carriage over 15 persons /Omnibus

(Delete as appropriate)

Identification Mark AG 50 LFF

Vehicle Reg. Book No.

Make TOYOTA

Type of Body COROLLA

Chassis No. 2T1BR18EDXC010344

Engine No 1ZZ9225462

Weight: Net ... ...

Authorised to carry ... ...

Gross ... ...

No. of Persons authorised to carry (including Driver)

Receipt No. A000210 Date 28-3-2019

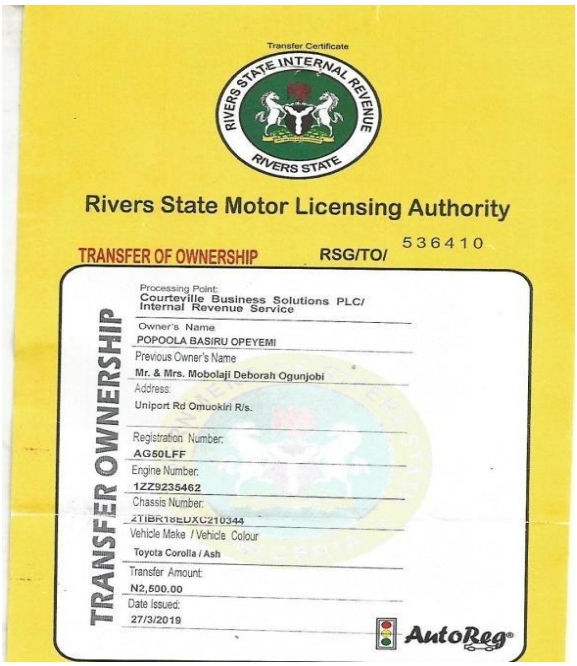
Station PHC

To Vehicle Owner POPOOLA BASIRU OPEYEMI

UNIPORT RD OMUOKIRI R/S

5. **HACKNEY STAGE CARRIAGE CERTIFICATE:** This document is also issued by the VIO for commuters that transport luggage. It certifies a roof top carriage as well as prescribes not weight for luggage to be carried in pick-ups, omini-buses and trucks.

6. **TRANSFER OFOWNERSHIPPAPER**



Transfer Certificate

RIVERS STATE INTERNAL REVENUE SERVICE

RIVERS STATE

Rivers State Motor Licensing Authority

TRANSFER OF OWNERSHIP RSG/TO/ 536410

TRANSFER OWNERSHIP

Processing Point:
Courteville Business Solutions PLC/
Internal Revenue Service

Owner's Name
POPOOLA BASIRU OPEYEMI

Previous Owner's Name
Mr. & Mrs. Mobolaji Deborah Ogunjobi

Address:
Uniport Rd Omuokiri R/s.

Registration Number:
AG50LFF

Engine Number:
1ZZ9235462

Chassis Number:
2T1BR18EDXC210344

Vehicle Make / Vehicle Colour
Toyota Corolla / Ash

Transfer Amount:
N2,500.00

Date Issued:
27/3/2019

AutoReg

CHAPTER 6

ROAD TRAFFIC CRASHES (RTC)

In this topic, we shall be looking at the following objectives:

1) Meaning of the Road
2) Physical Components of Road Transport System
3) Causes of Road Rage
4) Effect of RTC
5) Polices for Avoiding Crash
6) Preventive Measures
7) First Aid
8) First Aid Skills
9) Basic First Aid Materials
10) Basic Life Support/Cardio-Pulmonary Resuscitation
11) Transmission of Infection

ROAD TRAFFIC CRASHES (RTC)

Transportation (By Road) generally is imperative for individuals, corporate and national development and therefore must be hold in high esteem.

Transportation is the 5th life support line necessary for survival of the new born infact the 1st four are: water, nutrition, oxygen and environmental warmth.

THE ROAD

Roads are the main arteries of modern society's infrastructure, contributing heavily to the distribution of goods and human population.

PHYSICAL COMPONENTS OF ROAD

TRANSPORT SYSTEM

1. The Road users including pedestrians and drivers
2. Vehicles including bicycles as well as motorcycle
3. Road including their immediate environment

NOTE:
These components and their interaction through the movement and behaviour of the road users are influenced by and have effects on the society socially, economically and technological etc.

CAUSES OF ROAD RAGE

1. The driver
2. Drivers
3. Vehicle
4. Environment
5. Pedestrians

A. THE DRIVER

(i) Think ahead
(ii) Concentration
(iii) Tiredness
(iv) Drowsiness/Fatigue
(v) Drugs and drinking
(vi) Emotions
(vii) Level of skill
(viii) Over speeding
(ix) Passengers
(x) Use of cell phones while driving.

B. OTHER DRIVERS FAULT

(i) Over confidence
(ii) Dangerous overtaking
(iii) Aggression and arrogance
(iv) Smoke from vehicles
(v) Tyre burst of other vehicle.

C. THE VEHICLE

(i) Tyre failure
(ii) Brake failure
(iii) Steering lock
(iv) Engine problems

D. THE ENVIRONMENT

(i) Bad roads
(ii) Weather
(iii) Stationary vehicles, poles etc
(iv) Road without road signs.

E. PEDESTRIANS/OTHER ROAD USERS

(i) Children crossing without looking properly
(ii) Motorcycle drivers

EFFECTS OF RTC

(i) Loss of material wealth and property
(ii) Loss of human resources
(iii) Social disorder
(iv) Loss of productive time

POLICIES FOR AVOIDING CRASH

(i) Outright ban of underage driving
(ii) Experienced drivers to guide the less experienced learner drivers
(iii) Approved level of alcohol tolerance
(iv) Drivers rehabilitation courses after serious offences
(v) Improving driving test.

PREVENTIVE MEASURES

(i) Drivers
(ii) Vehicles manufactures
(iii) Government for the road and environment

DRIVERS

(i) Obey traffic rules and regulation always
(ii) Improved driver behaviour – drive to stay alive
(iii) Defensive driving
(iv) Avoid whatever can bring about crash

VEHICLE MANUFACTURERS

(i) Ensure that all motor vehicles meet safety standard regardless of where the vehicle are made, sold or used. Including provision of basic safety facilities.
(ii) Continue to improve vehicle safety by ongoing research and development.

GOVERNMENT

(i) Treatment of road surface to modify skid resistance
(ii) Applying special mastics at intensified black spots
(iii) Road drains and grooving for rainwater turnoff wide multi-lane roads with divided carriage ways.

FIRST AID

It is the provision of limited care for illness or injury to a sick or injured person until definitive medical treatment can be accessed, or until the illness or injury is dealt with.

It is the provision of limited care for illness or injury to a sick or injured person until definitive medical treatment can be accessed, or until the illness or injury is dealt with. First aid refers to the emergency or immediate care you should

Provide when a person is injured or ill until full medical treatment is available. Form in or conditions, first aid care may be enough. For serious problems, first aid care should be continued until more advanced care becomes available.

Decision to act appropriately with first aid can mean the difference between life and death. Begin by introducing yourself to the injured or ill person. Explain that you are a first aid provider and are willing to help. The person must give you permission to help them; do not touch them until they agree to be helped. If you encounter a confused person or someone who is critically injured or ill, you can assume that they would want you to help them. This is known as—implied consent.

FIRST AID SKILLS

There are certain stills which can be regarded as care regardless of where or how first aid is taught. First aiders are taught to focus on the
"ABC" of first aid before giving additional treatment.

(i) Airway
(ii) Breathing
(iii) Circulation

- First aiders should first evaluate and attempt to treat problems with casualty's airways.
- If the airway is open the first aider should then evaluate and attempt to check problems with circulation (circulation of blood) followed by breathing. Some instructors add a fourth step "D" for deadly bloods.

Fast facts on first aid

- The aims of first aid are to preserve life, prevent harm, and promote recovery.
- In first aid, ABC stands for airway ,breathing, and circulation.
- The recovery position helps minimize further injury.
- CPRstandsforcardiopulmonaryresuscitation.Ithelpsmaintaintheflowofoxy genatedblood.
- While doing chest compressions, you may hear cracks. This is normal.

BASIC FIRST AID MATERIALS

(1) Splint
(2) Bandage
(3) Trigular bandage
(4) Handkerchief
(5) Gauze
(6) Cotton wool
(7) Scissors
(8) Disinfectants
(9) Razor

FIRST AID KIT

Figure3

Consider purchasing a commercially available first aid kit or making your own. Having a kit in your home, your car, and at your place of work is essential to stay prepared.

Common items found in a first aid kit are

- Bandages, roller bandages, and tape
- Sterile gauze
- Antiseptic wipes and swabs
- Absorbent compresses
- Antibiotic cream
- Burn ointment
- Mask for breathing (rescue breathing/CPR)
- Chemical cold pack

Aims of first aid

The aims of first aid are:

- **Top reserve life:** Saving lives is the main aim of first aid.

- **To prevent further harm:** The person who has experienced the injury must be kept stable, and their condition must not deteriorate before medical services arrive. This may include moving the individual away from harm, applying first aid techniques, keeping them warm and dry, and applying pressure to wounds to stop any bleeding.

- **Promote recovery:** Taking steps to promote recovery may include applying a bandage to a wound.

How to practice first aid

- The most common term referred to in first aid is ABC. This stands for airway, breathing, and circulation. A fourth step will appear in the emergency procedures for some facilities.
- **A**irway: Make sure the airway is clear. Choking, which results from the obstruction of airways, can be fatal.
- **B**reathing: Once the airways are confirmed to be clear, determine whether the person can breathe, and, if necessary, provide rescue breathing.
- **C**irculation: If the person involved in the emergency situation is not breathing, the first aider should go straight for chest compressions and rescue breathing. The chest compressions will promote circulation. This saves valuable time. In emergencies that are not life-threatening, the first aider needs to check the pulse.
- **D**eadly bleeding or defibrillation: Some organizations consider dressings every wounds or applying defibrillation to the heart a separate fourth stage, while others include this as part of the circulation step.

INJURYANDWOUNDS

An injury is damage to your body. It is a general term that refers to harm caused by accidents, falls, hits, weapons, and more. In the U.S., millions of people injure themselves every year. These injuries range from minor to life-threatening. Injuries can happen at work or play, indoors or outdoors, driving a car, or walking across the street.

Wounds are injuries that break the skin or other body tissues. They include cuts, scrapes, scratches, and punctured skin. They often happen because of an accident, but surgery, sutures, and stitches also cause wounds. Minor wounds usually aren't serious, but it is important to clean them. Serious and infected wounds may require first aid followed by a visit to your doctor. You should also seek attention if the wound is deep, you cannot close it yourself, you cannot stop the bleeding or get the dirt out, or it does not heal.

Other common types of injuries include

- Animal bites
- Bruises
- Burns
- Dislocations
- Electrical injuries
- Fractures(broken bones
- Sprains and strains

Bruising

- Black and blue marks are often associated with bruises. A bruise, or contusion, appears on the skin due to trauma. Examples of trauma are acute or a blow to an area of the body. The injury causes tiny blood vessels called capillaries to burst. Blood gets trapped below the skin‘s surface, which causes a bruise.

- Bruises can occur at any age. Some bruises appear with very little pain, and you might not notice them. While bruises are common, it‘s important to know your treatment options and whether your condition warrants emergency medical attention.

- Dislocations are joint injuries that force the ends of your bones out of position. The cause is often a fall or a blow, sometimes from playing a contact sport. You can dislocate your ankles, knees, shoulders, hips, elbows and jaw. You can also dislocate your finger and toe joints. Dislocated joints often are swollen, very painful and visibly out of place. You may not be able to move it.
- A dislocated joint is an emergency. If you have one, seek medical attention. Treatment depends on which joint you dislocate and the severity of the injury. It might include manipulations to reposition your bones, medicine, a splint or sling, and rehabilitation. When properly repositioned, a joint will usually function and move normally again in a few weeks. Once you dislocate a shoulder or knee cap, you are more likely to dislocate it again. Wearing protective gear during sports may help prevent dislocations.

A fracture is a break, usually in a bone. If the broken bone punctures the skin, it is called an open or compound fracture. Fractures commonly happen because of car accidents, falls, or sports injuries. Other causes are low bone density and osteoporosis, which cause weakening of the bones. Over use can cause stress fractures, which are very small cracks in the bone.

Symptoms of a fracture are

- Intense pain

- Deformity-the limb looks out of place
- Swelling, bruising, or tenderness around the injury
- Numbness and tingling
- Problems moving a limb
  You need to get medical care right away for any fracture. An x-ray can tell if your bone is broken. You may need to wear a castor splint. Sometimes you need surgery to put in plates, pins or screws to keep the bone in place.

A sprain is a stretched or torn ligament. Ligaments are tissues that connect bones at a joint. Falling, twisting, or getting hit can all cause a sprain. Ankle and wrist sprains are common. Symptoms include pain, swelling, bruising, and being unable to move your joint. You might feel a pop or tear when the injury happens.
A strain is a stretched or torn muscle or tend on. Tendons are tissues that connect muscle to bone. Twisting or pulling these tissues can cause a strain. Strains can happen suddenly or develop over time. Back and hamstring muscle strains are common. Many people get strains playing sports. Symptoms include pain, muscle spasms, swelling, and trouble moving the muscle.

At first, treatment of both sprains and strains usually involves resting the injured area, icing it, wearing a bandage or device that compresses the area, and medicines. Later treatment might include exercise and physical therapy.

A compound fracture (also known as an “open fracture”) is a bone fracture that is accompanied by breaks in the skin, causing the broken ends of bone to come into contact with the outside environment.

A compound fracture has either punctured the skin or exposed the bone, which means it's extremely painful. Even without attempting to move the

What is a compound fracture?
Also known as an open fracture, compound fractures occur when there is an open wound or skin tear in the affected area, making the broken bone visible. It‘s often the fragment of the bone itself that breaks through the skin and causes the open wound. This is opposed to closed fractures ,in which the surrounding skin remains intact.

According to Ortho Info by the American Academy of Orthopedic Surgeons, compound fractures are often caused by **gunshots, motor-vehicle accidents, sports injuries or intense falls.** These verity of compound fractures will depend on the cause, wound size and location, plus the amount of tissue damage.

The signs and symptoms
Severe pain, swelling, tenderness and bruising are common signs of any fracture. The open wound, which can range from a significant amount of skin loss to a small puncture hole, is the defining characteristic of a compound fracture.

The risks
Because the skin is open, compound fractures have a high risk of infection. Contamination can occur at the site of the injury, especially if objects like dirt, grass, broken glass, mud and clothing reach the wound. For this reason, initial compound fracture treatment will prioritize **preventing infection development and progression,** according to Very well Health.

The treatment methods
Compound fractures require immediate medical attention so that a doctor can diagnose the injury and run the appropriate tests. From there, the doctor will give the patient antibiotics to ward off infection. Ortho Info noted that patients will also get a tetanus booster if they haven't had one within the last five years.

Most patients will undergo surgical wound cleaning and debridement to remove the damaged skin and foreign materials. From there, the doctor will stabilize the bone — typically with an external fix a tor because of its quick application, lack of foreign objects that can cause bacterial contamination and accessibility to the wound for proper care, according to Very well Health.

Some compound fractures will require skin grafts or other surgical procedures to permanently close the wound and promote healing. Pain medication and physical therapy will likely also be involved in the treatment process.

If you have a compound fracture wound, talk to your doctor about smart PAC by Advanced Tissue to get your prescribed wound care supplies delivered straight to your front door.

However, effective life saving first aid requires hands on training by experts, especially where it relates to potentially fatal illness and injuries, such as those that requires Cardio-Pulmonary Resuscitation (CPR), as the procedures may be invasive and carries a risk of further injury to the patient – which the "3 aims" first aid stated above, clearly try to avoid.

BASIC LIFE SUPPORT/CARDIO-PULMONARY RESUSCITATION
(1) Tilt head back, remove obstruction from mouth, lift chin
(2) Check for breathing

(3) Raise the alarm
(4) Check for signs of circulation
(5) Locate rib cage
(6) Locate sterna notch (mud sternum) position hands – fingers of chest
(7) Compress chest (30x)
(8) Pinch nose
(9) Deliver 2 rescue breaths
(10) Allow air to come out
(11) Unresponsive victims who are breathing
(12) Keep the airway open.

TRANSMISSION OF INFECTION
(1) No documented case of serious infection after rescue breathing
(2) Use a face shield or a face mask when appropriate.

RESUSCITATION
Emergency treatment to overcome the failure of breathing and circulation.
(1) Maintaining a clear airway
(2) Breathing into the victims lungs
(3) Compressing the chest to make blood circulate round the body
(4) Turning the victim onto his side (recovery position)

WAY RESUSCITATION?
All parts of the body need oxygen to live
- Clear airway
- Breathing
- Circulation

CHAPTER 7

VEHICLE MAINTENANCE

In this topic, we shall be looking at the following objectives:

1) Meaning of Defensive Driving
2) Attribute of Defensive Driver
3) Qualities of Defensive Driver
4) Element of Defensive Driver
5) Responsibilities of a Driver
6) Drivers Psychology
7) Function of a driver behind the steering wheel
8) Meaning and Rules of Overtaking
9) Following Distance
10) Stopping distance
11) Breaking
12) Reversing
13) Uses of Mirror
14) Uses of the Horn
15) The lighting system
16) The Steering
17) Hazard Perception
18) Parking

VEHICLE MAINTENANCE


Meaning of Maintenance: Can be defined as the actions performed to keep some machines or system functioning or in service.

Vehicle parade this involves checking of the necessary things in the vehicle detect if any of them is malfunction. The following are the categories of checking according to the Nigeria Highway Code.

FIRST PARADE: Including checking of water, oil, belt, tyres and other lubricants. This commonly referred to as WOFT.

W	=	Water:	Check level in the radiator
O	=	Oil :	Check for the level of engine oil
F	=	Belt :	Check fan belt for tension and cuts
T	=	Tyres:	Check for cut, punctures depth of threading pressure, alignment symptoms and wheel nets.

SECOND PARADE: Safety parade refers to the examination of lighting system, break, clutch, wipers and other fixtures.

THIRD PARADE: refers to checking vehicle security devices such as the steering mechanism, horns, spare tyres, fire extinguisher etc.

FOURTH PARADE: Walk around the vehicle to check for dent and loose parts.

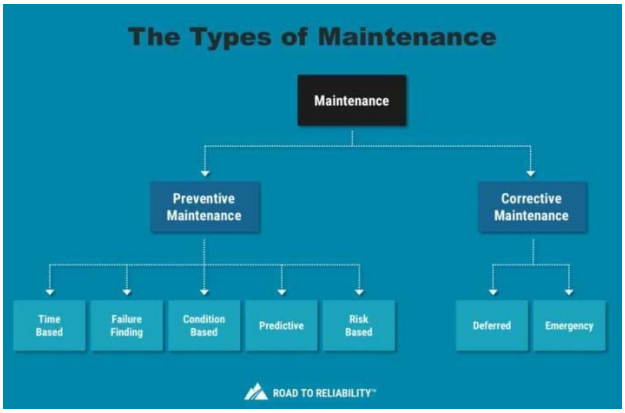
FIFTH PARADE: Check and examine your body for physical fitness to device.

VEHICLE MAINTENANCE
It is the act of keeping vehicles in good conditions and proper usage. It involves checking and regular repairing of vehicles.

TYPES OF MAINTENANCE
There are basically two types of maintenance:
(1) Planned Maintenance: This referred to an organized preservation method carried out for prevention and control measures.
(2) Unplanned Maintenance: This referred to the maintenance carried out without fore knowledge. This is always impromptu in nature.

There are 9 Types of Maintenance split between Preventive Maintenance and Corrective Maintenance.

Preventive Maintenance is done before a failure occurs and consists of maintenance types like: Time Based Maintenance, Failure Finding



Maintenance, Risk Based Maintenance, Condition Based Maintenance and Predictive Maintenance.
Corrective maintenance is done after a failure has occurred either as Deferred Corrective Maintenance or as Emergency Maintenance.

Preventive Maintenance (PM)
- Time Based Maintenance (TBM)
- Failure Finding Maintenance (FFM)
- Risk Based Maintenance (RBM)
- Condition Based Maintenance (CBM)
- Predictive Maintenance (PDM)

- When we do ***preventive maintenance*** we are doing a task ***before a failure has occurred***. That task can be aimed at preventing a failure, minimising the consequence of the failure or assessing the risk of the failure occurring.
- When we are conducting ***corrective maintenance*** the ***failure has now occurred*** and we are basically reinstating equipment functionality. To be clear, corrective maintenance can be the result of a deliberate run-to-failure strategy.

Preventive Maintenance (PM)
Preventive maintenance can be defined as *"an equipment maintenance strategy based on replacing, or restoring, an asset at a fixed interval regardless of its condition.* Scheduled restoration tasks and replacement tasks are examples of preventive maintenance tasks.||

Preventive maintenance (or preventative maintenance) is basically a type of maintenance hat is done at a regular interval while the equipment is still functioning with the objective of preventing failure or reducing the likelihood of failure.

Preventive maintenance can be time based i.e. every week, every month or every three months. But preventive maintenance can also be based on usage e.g. every150cycles, every10,000 hrs or like your car: service every 10,000km.
Apart from the regular interval approach (time based maintenance) there are also other types of maintenance that fall within the category of preventive maintenance:

- Time Based Maintenance (TBM)
- Failure Finding Maintenance (FFM)
- Risk Based Maintenance (RBM)
- Condition Based Maintenance (CBM)
- Predictive Maintenance (PDM)

In the following paragraphs, I will explore each of these types of maintenance in more detail including when you should consider using them.

Time-Based Maintenance (TBM)
Time-Based Maintenance refers to replacing or renewing an item to restore its reliability at a fixed time, interval or usage regardless of its condition.

This is what **Mowbray** calls Scheduled Restoration or Scheduled Discard tasks in his **RCMII** book.

I limit the use of that phrase as for some reason people then jump to the conclusion that another maintenance is not scheduled. When infact, of course, all maintenance should be scheduled through our Weekly Schedule. The only exception would be Emergency Maintenance, which due to its very nature of requiring immediate attention cannot be scheduled.

The purpose of Time Based Maintenance is to protect yourself against the failure of known wearing parts which have predictable Mean Time Between Failure (MTBF)i.e. Time Based Maintenance assumes that the failure is age related and a clear service life can be determined. Or, that it‘s simply not worth the effort to assess the condition and a time based replacement is more economical and still (reasonably) effective.
Time Based Maintenance can never effectively manage non-age related failure modes and therefore should only form a small part of your overall maintenance program as >70% of the failure modes in your plant are not age related

It is important to realize that in many industries companies do have to complete certain tasks to meet regulatory compliance requirements and these would typically be executed on a fixed time interval i.e. Time Based Maintenance. But even with compliance related maintenance, there are often opportunities to engage a regulator and look at moving to for example risk-based approaches. A good example of this would be adopting **Risk-Based Inspection (RBI)**for vessel inspections instead of e.g. 4-yearly internal vessel inspections.

Failure Finding Maintenance (FFM)
Failure Finding Maintenance tasks are aimed at detecting hidden failures typically associated with protective functions. Think pressure safety valves, trip transmitters and the like.

This type of equipment won‘t be required to function until something else has failed. That means that under normal operating conditions you will not know whether this equipment is still functional i.e. the failure modes are hidden.

And since these failures are hidden, you‘ll need to find them before you are relying on that equipment to protect you.

Simple really.

It‘s important to realize that failure finding maintenance tasks do not prevent failure but simply detect it. And once detected you‘ll have to repair the failure you found. Failure Finding Maintenance is conducted at fixed time intervals typically derived from legislation or risk based approaches.

Risk Based Maintenance (RBM)
Risk Based Maintenance (RBM) is when you use a risk assessment methodology to assign your scarce maintenance resources to those assets that carry the most risk incase of a failure(remembering that risk=likelihood x consequence).

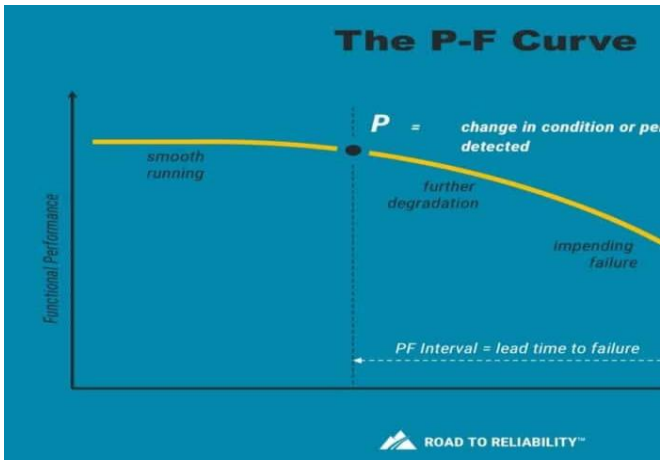
As a result, equipment that has a higher risk and a very high consequence of failure would be subject to more frequent maintenance and inspection. Low risk equipment may be maintained at a much lower frequency and possibly with a much smaller scope of work.
When you implement a Risk Based Maintenance process effectively you should have reduced the total risk of failure across your plant in the most economical way.

Risk-Based Maintenance is essentially preventive maintenance where the frequency and scope of the maintenance activities is continuously optimized based on the findings from testing or inspection and a thorough risk assessment. **Examples of Risk-Based Maintenance** would be Risk-Based Inspection as applied to static equipment like vessels and piping or even pressure relief valves.

Condition Based Maintenance (CBM)
Most **failure modes** are not age related. However, most failure modes do give some sort of warning that they are in the process of occurring or are about to occur.

If evidence can be found that something is in the early stages of failure, it may be possible to take action to prevent it from failing completely and/or to avoid the consequences of failure. Condition Based Maintenance as a strategy therefore looks for physical evidence that a failure is occurring or is about to occur. Thinking of CBM in this way shows its broader applications outside condition monitoring techniques often only associated with rotating equipment.

An important concept within Condition Based Maintenance is the P-F curve shown in the figure below:



The curve shows that as a failure starts manifesting, the equipment deteriorates to the point at which it can possibly be detected (point–P||).

If the failure is not detected and mitigated, it continues until a functional failure occurs (point —F||). The time range between P and F, commonly called the P-F interval, is the window of opportunity during which an inspection can possibly detect the imminent failure and give you time to address it.

It is important to realize that CBM as a maintenance strategy does not reduce the likelihood of a failure occurring through life-renewal, but instead is aimed at intervening before the failure occurs, on the premise that this is more economical and should have less of an impact on availability.

In other words: condition monitoring does not fix machines and condition monitoring does not stop failures. Condition monitoring only lets you find problems before they become a failure.

A common rule of thumb is that the interval between CBM tasks should be one-half or one-third of the P-F interval.

How much more effective CBM is above break down maintenance depends on how long the P-F interval is With plenty of warning the rectification can be planned, materials and resources can be mobilized and break down prevented (though production is still stopped for the maintenance duration).When the P-F interval is only a few days the resulting organizational and work place actions are much like a break down and the value of CBM is largely lost.

For CBM to be effective as a strategy, early intervention is essential. This requires an efficient and effective process for data gathering, data analysis, decision making and finally intervention.

Predictive Maintenance(PDM)

Up until recently when people spoke about Predictive Maintenance (PDM) this was essentially as a synonym for Condition Based Maintenance. But with the

advent of Artificial Intelligence, much lower costs of equipment sensors (IIOT) and machine learning there is clearly a difference appearing between Predictive Maintenance (PDM) and Condition Based Maintenance(CBM), at least in my view.

I see Predictive Maintenance as an extension, amore advanced approach to CBM where we use potentially many process parameters gained from online sensors to determine if our equipment is moving away from stable operating conditions and is heading towards failure. The central idea here is to predict when the failure is going to occur and the undetermined the appropriate time for maintenance intervention.

There are a lot of (very large) companies actively moving into this space and it is certainly a fast-moving and exciting part of our discipline as

Maintenance & Reliability professionals. However, I do still believe that even the most advanced Predictive Maintenance approaches need to be under pinned by **sound reliability principles** and understanding. And also believeth at the use of Predictive Maintenance.

Corrective Maintenance (CM)
A Run to Failure or Corrective Maintenance strategy only restores the function of an item after it has been allowed to fail. It is based on the assumption that the failure is acceptable (i.e. no significant impact on safety or the environment) and preventing failure is either not economical or not possible.

Apart from being the outcome of a deliberate **Run to Failure strategy** Corrective Maintenance is also the result of unplanned failures which were not avoided through preventive maintenance.

A run to failure strategy can effectively be used for general are alighting, smart process instrumentation (without trip functionality) etc. where the consequence of failure is limited and would not necessitate need for an urgent repair.

When opting for corrective maintenance as a strategy it is essential to ensure that the failure mode sunder consideration do not have the potential to become Emergency Maintenance. You see, if you adopts run-to-failure for equipment that once it has failed must be restored immediately to have doomed your organization to a reactive maintenance environment. A reactive maintenance environment is not where you want to be. It is more expensive, less efficient, and less safe.

So although a run-to-failure strategy can be a good option, make sure you decide wisely.

Deferred Corrective Maintenance
In the chart of maintenance types I broke _ corrective maintenance‘s into two sub-types:

- Deferred Corrective Maintenance
- Emergency Maintenance(EM)

And that was very deliberate because it is so essential that we absolutely minimize the amount of Emergency Maintenance we allow into our organizations. As I already pointed out above Emergency Maintenance is expensive, various sources have suggested that Emergency Maintenance is 3to5 times as expensive as normal ‘preventive maintenance.

Emergency Maintenance typically leads to longer equipment out ages and more production impact .And it is less safe. So when a corrective maintenance work request is raised it is essential that you prioritize it properly to make sure that where possible you defer the work request and give your team the time to properly plan and schedule the work.

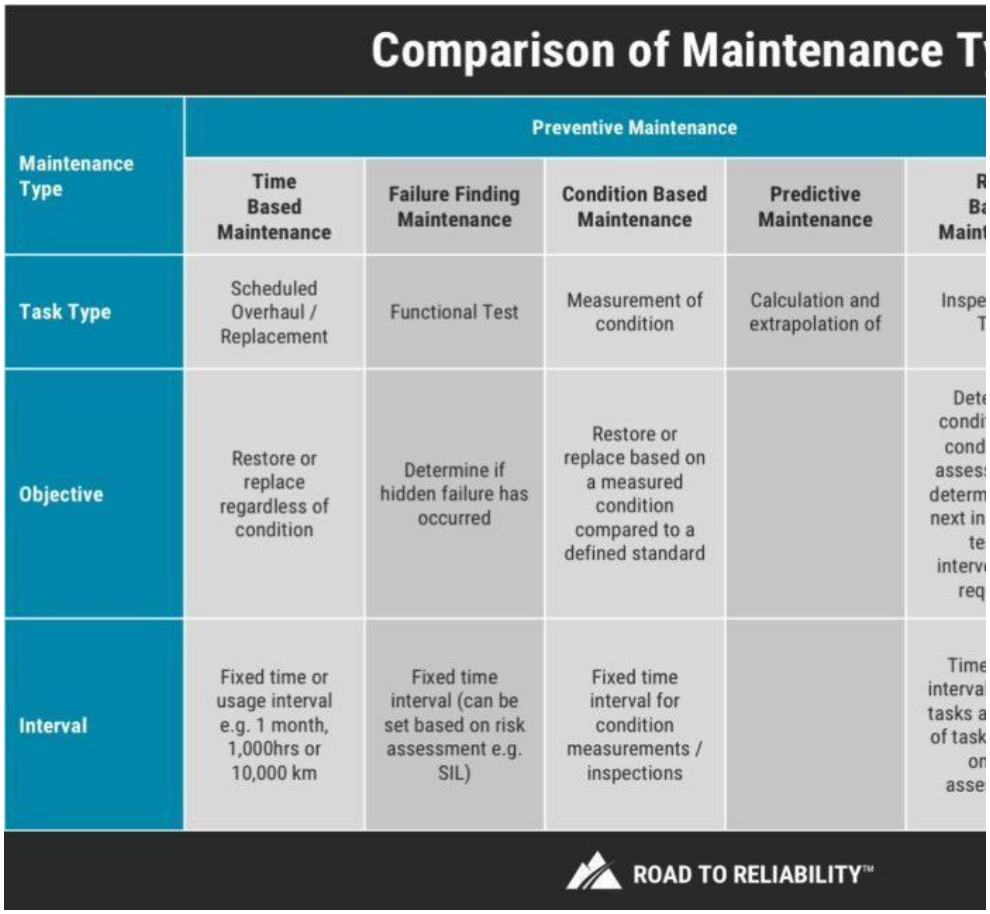
If you want to read more about prioritization of corrective maintenance have a look at the article **You Will Fail Without Planning & Scheduling.**

Emergency Maintenance (EM)
Emergency Maintenance is corrective maintenance that is so urgent that it breaks into your Frozen Weekly Schedule (you do have one don‘t you?).

It upsets your plans and schedules and typically throws everything into disarray.
Some people thrive in this type of environment and often get heralded as heroes when they‘ve worked 16hrsnon-stop to get production back online. But when it comes to the **Road to Reliability** it is a dead end.

So Emergency Maintenance is the one and only maintenance type that were ally want to avoid as much as possible. In fact, World Class organizations ensure that less than 2% of their total maintenance is Emergency Maintenance.

An efficient and effective Preventive Maintenance Program will have a mix of all these different types of maintenance.



What Is Break Down Maintenance?

And frequently asked question is what is breakdown maintenance 'and as it's not in my explanation I thought I'd just cover it here briefly. As far as I am concerned, breakdown maintenance is simply corrective maintenance and not another type of maintenance in itself. In the case of breakdown maintenance you've had a failure and so now it needs to be fixed. And depending on the risk associated with that breakdown it could be urgent or less urgent.

But, in many people's mind, breakdown maintenance is urgent maintenance, maintenance that needs to be done right now i.e. Emergency Maintenance. And if that's the case for you, you know what to do: get rid of it!

What Is The Difference Between Preventive Maintenance And Predictive Maintenance?

I think I have covered this in the article, but as it's such a frequently asked question I'll just summaries the key differences here:

- Preventive maintenance covers multiple types of maintenance that are used before a failure has occurred. Predictive maintenance is a form of preventive maintenance.

- When most people talk about preventive maintenance they really mean Time Based Maintenance which is pair or replacement on a fixed interval irrespective of the condition of the equipment. The interval can be time-based (days, weeks or months) or usage-based (operating hours, cycles or km).

Are Planned Maintenance And Preventive Maintenance The Same?
In my view, they are not the same. Planning refers back to the maintenance planning & scheduling process so **planning maintenance** is about preparing the maintenance work so that is ready to execute. Whereas preventive maintenance is maintenance hath as been identified to prevent or mitigate failure mode.

So in my view, Planned Maintenance is maintenance that has been through the planning process and is properly prepared with all job steps, labour, parts, and tools identified and organized.

All Preventive Maintenance should be Planned Maintenance as it has been identified upfront and there is no reason why it would not go through the normal maintenance planning & scheduling process.

The opposite of Planned Maintenance is Unplanned Maintenance which has not properly been prepared and is planned on the plan as the job is done. This is highly inefficient and something you should avoid at all cost. The only time you should be conducting unplanned maintenance is when you have a high priority work request that comes in and is so urgent that you break into the Frozen Weekly Schedule to complete the work without going through the normal planning & scheduling process. I refer to this as Emergency Maintenance.

Routine Vehicle Maintenance 101: What You Should Know
Vehicles are machines, and like any machine they need maintenance. For most vehicles, regular maintenance begins at 5,000 miles and continues from there every 5,000-10,000miles. Of course, checking your car on a more regular basis is even better.

Maintenance keeps your vehicle running smoothly and safely down the road for a much longer distance compared to never doing upkeep. Your owner‘s manual will outline all of the maintenance that needs to be done and when it needs to be done so that you‘re prepared.

But do you need to pay for a mechanic to handle the vehicle maintenance? You can handle a lot of basic vehicle maintenance yourself by following the advice below.

9 Vehicle Maintenance Measures You Can DO

You need a mechanic for most repairs, but there's a lot of vehicle maintenance you can do on your own. Here's a rundown that will get you started.

1. Acquaint Yourself With Your Owner's Manual

Every vehicle has an owner's manual. It's a thick book typically squirreled away in the glove box. If you can't find your copy, an electronic version could be online.

Otherwise, contact your dealer for a copy.

With manual in hand, head to the maintenance schedule section. Take note of the intervals for maintenance items like the engine oil, oil filter, tire rotation, belts, hoses and so on. It's important to follow these manufacturer recommendations to keep the engine running as smoothly as possible.

2. Check Your Tires Monthly

A lot is riding on your tires-like the entire vehicle. The thing that keeps your car driving down the road is the tires. They need to be properly inflated to do their job as well as lessen the chance of a blowout.

You probably know how to add air to your tires already. What you may not know is the correct tire pressure, which is extremely important. You'll find the ideal tire pressure on a placard located on the driver's door jamb or in the owner's manual.

Tires should be inflated when they are cold (driven less than one mile) to get an accurate reading. If that isn't possible, add 4 PSI to there commended amount, explains **Bridgestone Tire.** Check your spare tire while you're at it and confirm all pressures with a tire gauge once the tires have rested.

3. Change Your Oil and Oil Filter on Schedule

Oil is your engine's life blood. It serves as a lubricant, keeping important engine parts from grinding against each other and destroying the engine. Motor oil that's not changed regularly can damage your engine as accumulated contaminants cause friction when they rub against parts.

What type of oil should you use—petroleum-based or synthetic? Is one better than the other? According to Edmunds. Com Engineering Editor Jason Kavanagh the type of oil is not important. **He noted**, —As long as the oil meets the service and viscosity requirements set out in your owner's manual, you can switch back and forth as much as you want.

4. Replace the Air Filter With Oils Changes

When it comes to the air filter, you may need to replace it once or twice each year. It largely depends on how much you drive. It‘s best practice to check the air filter when you change your oil.

5. Inspect All Other Fluids

Motor oil isn‘t the only fluid that needs to be checked. Experts recommend checking your car brake fluid, transmission fluids, coolant and wind shield washer fluid.

Like motor oil, you‘ll check transmission fluid with a dipstick. Determine brake fluid, coolant and washer fluid levels by removing related covers and visually inspecting each. They should reach a designated fill line.
NEVER remove the radiator cap to check coolant levels. You risk getting scalded if the cap is removed. Instead, check the coolant level in the nearby transparent refill container, says **Car Talk**.

6. Examine Belts and Hoses

If you want to go one step beyond basic routine vehicle maintenance, then inspect the hoses and belts in the engine bay. These hoses direct coolant flow to ensure the engine doesn‘t overheat. If a hose has separated, shows cracks or bulges, then have it replaced.

Similarly, check the belts too. The timing belt, as found in most cars and small SUVs, is critical to the operation of your engine, notes **Your Mechanic**. If this belt shows signs of wear, including cracking, glazing and material loss (chunks missing from the belt itself), then replace it ASAP. If the timing belt goes while driving it can cause serious engine damage.

7. Always Listen and Feel for Brake Issues

Brakes are a critical component on every vehicle. You should always be aware of how your brakes feel and what they sound like every time you drive. If the brakes feel spongy or it takes more pressure to apply the brakes than normal they need to get inspected by a professional.

- Brake sounds can indicate when maintenance or repair is needed. Here‘s a quick run down of common brake sounds:
- Squealing- It‘s time for new brake pads when you hear squealing because the ones you have now are worn out and rubbing against the rotor.

- Grinding - This isn‘t a normal sound, but it may not be a major issue if brake grinding is happening only the first time you drive the vehicle in a day.

When the humidity levels are high outside, rust can form on the brake rotors in a matter of a day if the vehicle isn‘t driven. The grinding sound is the rust getting knocked off. The simple fix is to park the vehicle in a garage when it‘s snowing, raining or humid.

- Rattling – A rattling or vibration sound suggests one of the rotors is warped or worn out and needs to be replaced.

- Intermittent Sounds- If brake sounds come and go it could be an indicator of brake fade from overheating. When the brake pads, rotors or brake fluid over heat you may hear brake sounds and the brakes won‘t feel as responsive. This problem should be looked at by a professional who can pinpoint the cause and fix it.

8. Replace Wiper Blades as Needed

If the windows streak or the blades screech when the system is operating it‘s time for a replacement set. This is actually a very important vehicle maintenance measure. If you find yourself in a rainstorm the windshield wipers are what give you visibility. You never know when you may need them so check the wiper blades often.

9. Remove Battery Corrosion

As for the car battery, the main requirement here is to ensure that the battery terminals remain free from corrosion. Just like the brakes, environmental factors can cause buildup that hinders operation. A wire brush along with a solution of water and baking soda will knock the corrosion right off.

1. **Check all fluids**, including engine oil, power steering, brake, and Transmission as well as wind shield washer solvent and anti freeze.

2. **Check the hoses and belts** to make sure they are not cracked, brittle, frayed, loose or showing signs of wear.

3. **Check the battery** and replace if necessary. Make sure the cable connection is clean, tight and corrosion free.

4. **Check the brake system** annually and have the brake linings, rotors and drums inspected at each oil change.

5. **Inspect the exhaust system** for leaks, damaged or broken supports, brackets and hangers.
6. **Schedule a tune up** to help the engine deliver the best balance of power and fuel economy and produce the lowest level of emissions.

7. **Check the heating, ventilating and A/C system** as proper heating and cooling performance is critical for interior comfort and for safety reasons such as defrosting.

8. **Inspect the steering and suspension system** annually including shock absorbers, struts and frontend components.

9. **Check the tires**, including tire pressure and tread depth. Check for any signs of bulges and bald spots. Uneven wear indicates a need for wheel alignment.

10. **Check the wipers and lighting** so you can see and be seen. Replace worn wiper blades and so you can see clearly when driving during precipitation.

PURPOSE OF VEHICLE MAINTENANCE

(1) To prevent mechanical, electrical any other types of failure
(2) To ensure prolong life span of the vehicle
(3) To device optimum performance of the vehicle
(4) To ensure safety of life and property.

AREAS OF VEHICLE MAINTENANCE

ENGINE OIL.

Learn the risks of not changing oil in accordance with your vehicle's owner's manual.

Except for electric vehicles, car ownership goes further than starting the engine and driving it. Cars are complex machines that combine a collection of mechanical systems working in complete harmony. With cars' complex mechanical nature comes maintenance, as most of their mechanical systems have specific fluids you must change to keep it running in top order. Our busy lives sometimes get in the way, though, and we forget all about our vehicle's required maintenance. Below, we'll cover all the risks of not changing oils and fluids in accordance with the owner's manual.

Risks of Not Changing Oil

Your vehicle has a wide range of oils and fluids with various purposes, ranging from lubrication to cleaning to maintaining temperatures. Most of these oils and fluids require periodic changes to keep your vehicle running at its best for the long term.

Here's what you risk by not changing your oil and fluids at the recommended intervals.

Risks of Not Doing an Oil Change

Your oil is the primary lifeblood of your engine. Without it, the mechanical motion inside your engine would create excessive friction and heat in mere seconds, resulting in catastrophic damage. Basically, the engine would seize up, or the components would break apart. As the oil in your engine breaks down, moisture, fuel, and other contaminants dilute it, decreasing its viscosity and impacting its ability to lubricate. It can also develop sludge that can increase friction and stress on the engine's moving components. Changing your engine's oil and oil filter at the manufacturer's recommended interval ensures you get fresh motor oil in the engine before oil breaks down enough to cause any damage.

If you don't change your dirty oil at the automaker's recommended interval, which is generally every three months or 4,800 km to every seven months or 12,000 km, you risk the engine oil losing its ability to lubricate and clean the internal engine components. This can cause additional stress on the internal engine components and lead to excessive engine wear or possible premature failure.

While full engine failure may take some time to occur, other early symptoms will arise, including tapping or knocking from the car's engine, the engine running rough, and reduced fuel economy. Changing to a synthetic oil doesn't mean you can wait longer or skip oil changes. Yes, synthetic generally has a longer oil life than regular oil, but the manufacturer's recommended oil change interval is based on the engine's tolerances, not the oil you use.

Check engine oil at every other fill-up. For an accurate reading of the engine's oil level: ...

Change the oil frequently. (3000miles to 5000miles)

Avoid overfilling your crankcase with oil.

- Wipe the oil pan plug clean.
- Consider adding oil coolers.
- Synthetic oil is better.
- Heavier is not always better.

GEARBOX OIL

Gear oil is a lubricant designed for use in transmissions, manual gearboxes, differentials, transaxles and transfer cases in your car or truck. Gear oil helps your transmission run smoothly. More importantly, it helps protect critical internal components in your car's gear systems from wear and heat damage. If you don't replace your transmission fluid, **it will break down much like engine oil and lose its lubricating and cleaning properties**. This leads to high temperatures, sludge buildup, and excess friction, which can damage the internal clutches that shift the gears

Automatic transmission: fluid is one of the hardest-working fluids in your vehicle. It's not only responsible for hydraulic pressure in the transmission that allows it to shift gears, but it also provides lubrication, cleans the transmission's

internal moving parts, and helps regulate the transmission's internal temperature.

Most manufacturers recommend changing the transmission fluid and filter — if applicable - every 48,000 to 100,000 km. In some cases, you will need a repair facility to perform a flush using a machine, but other vehicles require you to only remove the transmission pan, drain the fluid, and replace the fluid and filter.

If you don't replace your transmission fluid, it will break down much like engine oil and lose its lubricating and cleaning properties. This leads to high temperatures, sludge buildup, and excess friction, which can damage the internal clutches that shift the gears.

As the internal clutches wear, the friction and heat will continually increase. After enough time passes, all the friction material on the clutches will wear away, resulting in transmission slippage or failure of other internal components.

Once slippage or internal component failure occurs, a new or rebuilt transmission is the only way to get the vehicle back to normal.

Risks of Not Changing Manual Transmission Fluid

Unlike automatic transmission fluid, manual transmission fluid doesn't have any hydraulic properties. Instead, its only purpose is to lubricate and clean the internal transmission components.

Like most oils, manual transmission fluid breaks down over time. It can also become contaminated by outside debris and metal shavings from the transmission's internal components.

Most manufacturers recommend changing the manual transmission oil every 48,000 to 96,000 km to combat viscosity loss and contamination.

If you don't change the manual transmission fluid, the thinning viscosity limits its ability to lubricate the transmission's components. This can make it difficult to shift gears and put extra stress on the transmission, potentially causing early failure

Power steering oils:

Power steering fluid is the hydraulic fluid used in the steering system to create a hydraulic link between the steering wheel and the front wheels. That decreases the amount of effort required to turn the wheels. Power steering fluid also lubricates the moving parts within the steering system

.Here are some symptoms to look out for:

1. Color changes in your power steering fluid. A change in power steering fluid color might mean it is beginning to oxidize. ...
2. Bubbles in your power steering fluid. ...
3. Leaky fluid. ...
4. Difficulty Steering. ...
5. Strange Noises.

On average, vehicles need a power steering fluid flush **every 40,000-80,000 miles**. In some cases, manufacturer recommendations can go even higher or lower than this range. Your recommended flush routine depends heavily on your type of vehicle—as the steering system and fluid needs can vary. How long does power steering last in a car?

Our recommendation for replacing your car's power steering fluid is **every 40,000 miles or every two years of driving**. Power steering fluid lasts a long time, so you shouldn't need to change it more frequently than that.

HYDRAULIC OIL:

Hydraulic oil is used for many of the same reasons as oil but has wider use in automobile systems like automatic transmissions, as well as power brakes and steering. Aircraft systems also require hydraulic fluids. Viscosity is of paramount importance in choosing such oil.

- Protection against corrosion and rust. In other words, hydraulic oils are hydrolytically stable.
- Optimal operations even under extreme working temperatures and conditions thanks to the viscosity stability of hydraulic oils.
- Protection from foaming and formation of sludge and deposits. In return, the system's efficiency, reliability, and performance are increased.
- Protection when the hydraulic system is exposed to air and water means that hydraulic oils possess anti-oxidation properties.
- Filters of hydraulic systems maintain their filtration efficiency as hydraulic oils also serve as contaminants eliminators.
- Hydraulic equipment is protected against water emulsion as the oil quickly separates water and prevents damage from occurring. This property is also known as demulsibility.
- Protection against wear and tears.
- Although the life of a hydraulic oil really depends on many variables, including quality of oil, operating conditions, and potential contamination, a good quality hydraulic oil should last **at least 6 months if conditions are not severe** thanks to the additive packages intended for heavy-duty applications.

When something is maintained, the idea is to keep it in a good and functional state. Vehicle maintenance refers to a practice where an automobile is serviced

On a regular basis to prevent a major breakdown or the need for major repair.

Examples of the type of auto services that may be sought for maintenance purposes include changing the oil, changing the spark plugs, and rotating the tires.

An auto mechanic can perform regular car maintenance.
It is believed that an automobile will last longer and operate better if a person adheres to the vehicle maintenance schedule. This is generally a document or booklet that comes with the car that prescribes when certain services should be sought. In some cases, if a person does not adhere to this schedule, she risks voiding her **warranty**.

Some people, for whatever reason, may not have a vehicle maintenance schedule. This does not mean it is a lost cause. An **auto mechanic** can generally prescribe a maintenance schedule that will help a person keep her car functioning properly. General maintenance schedules are also commonly available on the Internet.

Regular service and vehicle maintenance can help avoid break downs while travelling.
There are various types of vehicle maintenance. Some of them, such as changing the oil or replacing the timing belt, are necessary to help prevent a major breakdown. Other services, such as rotating the tires and changing the **brake pads**, are necessary to reduce the amount of money spent on replacement parts. For example, when tires are not rotated, they may not last as long.

Some driver's maintain a vehicle maintenance schedule.
Safetyisagoodreasontomaintainavehicle.Changingwindshieldwiperblades is an example of something that should be done from time to time instead of when there is an apparent need. If a person waits until she is in the midst of a storm and then discovers her wiper blades need changing, she will place herself at risk. The same is true with tires that are not changed according to the manufacturer's recommendations. The result could be a blow out that causes an accident.

Replacing brake pads is part of regular vehicle maintenance.
Another reason that people should take vehicle maintenance seriously is because it adds to the value of the automobile. In many instances, when a person attempts to **sell a car** or trade it in for a new one, a maintenance record is requested. If it can be shown that the vehicle has been properly maintained, a potential buyer is likely to pay more

Signs That Your Engine Needs an Oil Change or Maintenance
Oil is to your car what blood is to your body. However, your body can purify your blood and make new blood cells over time. Your car cannot do that. Oil changes are part of your regular, ongoing maintenance, and while they seem relatively basic, they‘re actually one of the most critical types of automotive maintenance. Failing to change your oil regularly can lead to a host of problems, ranging from reduced fuel economy to serious engine damage to completely destroying the engine.

How do you know when it‘s time to change your oil?
We‘ve compiled a list of the top 10 signs that your engine needs an oil change, or that there‘s additional related maintenance work to bed one.

What‘s It All About?
Before we dive right into the signs that your engine needs an oil change, it‘s important to know a bit more about oil, the various types on the market, and why it needs to be changed in the first place.

What Is Engine Oil?
Engine oil is a thick fluid that provides lubrication and cooling for your car‘s engine. All auto engines need oil, but the type and weight (thickness) of that oil varies from engine to engine. It also varies by when your engine was manufactured. Newer engines have stricter requirements for fuel economy and oil consumption, and that means narrower clearances within the engine. Most modern engines use thinner oil than they would have 10, 20, or 30 years ago.

There are two primary types of engine oil — mineral oil and synthetic oil. Mineral oil is a petroleum product, derived from crude oil, just like gasoline. Synthetic oil is developed in a laboratory, instead. There are also blends that mix the two oil types together.

Generally, mineral oil is cheaper, but does not last as long. Synthetic oil is more expensive, but reduces demand for natural resources, and lasts a great deal longer (several thousand Miles in most cases).

Your engine is designed to use a specific weight oil, which is usually listed in the owner‘s manual, or on the engine oil cap itself. It may read as:

- 0W20
- 5W20
- 5W30

There are heavier weights used in some vehicles, but they have become increasingly rare (10W30, 10W40, 20W50, etc.). It‘s important that you stick

with the oil weight the auto maker specifies for your engine, or it could result in reduced fuel economy or even engine damage overtime.

Why Is It Important?
Engine oil is important for several reasons:

The most important reason for engine oil is lubrication. It keeps all the moving parts protected, and prevents them from rubbing against one another. Without oil, metal – on – metal wear would destroy your engine in a very short time. Engine oil creates an atoms – thin layer between moving parts, preventing full contact and prolonging engine life.

The second reason for engine oil to be used in your car is cooling. Most of the cooling needed is supplied by the coolant system (radiator, thermostat, water pump, etc.). However, engine oil does provide some supplemental cooling for areas of the engine where coolant cannot reach.

Engine oil is also responsible for helping to clean the engine, removing debris like metal finings and other potentially damaging deposits.

When Should I Change My Oil?
There is no single oil change interval recommended for all engines any longer. Once upon a time, most mechanics recommended changing your engine oil ever three months or 3,000 miles, which ever came first. That is no longer the case. With higher quality oils and oil blends, we can now drive longer between oil changes. Some oil weights can last upto10,000 miles between changes (high-end synthetic oils).

However, the best rule of thumb is to follow your automaker‘s recommendation, which should be listed in your owner‘s manual. If you don‘t have your manual, go with the three-months/3,000-miles rule for conventional mineral oil, and follow your mechanic‘s recommendation for synthetic oils.

What Is Viscosity?
Oil viscosity is nothing more than a term used to express oil‘s ability to lubricate your engine and protect moving parts. Over time and through heat, oil thin sand becomes less viscous. This reduces its viscosity and its ability to protect your engine. Thus, the need to change your oil regularly.

What Will Happen If I Drive without Oil?

If you were to drive your car with low engine oil, it may do nothing more than result in minor excess wear to internal engine components. It really depends on how low the oil level is. You are generally safe up to about a quart low. However, if you were to drive with no engine oil, the engine would quickly seize up, and you would need to replace the entire engine.

What Will Happen If I Put the Wrong Oil in My Car?

Again, it really depends on the type of oil you add to your engine. In some instances, you'll notice no difference at all. In others, you'll see reduced fuel economy. In very serious cases, you could cause excess wear to the oil pump, leading to a shorter engine life.

For instance, if your car is rated to use 5W20 and you add 5W30 instead, you're not really going to notice much. However, If you added 20W50, you would definitely notice lower fuel mileage, sluggish performance, and perhaps even engine knocking. Always use the oil weight recommended by your auto maker.

Signs That You Need to Change Your Oil.

Now that we've covered a bit about what engine oil is, why changing it matters, and the type of oil on the market, let's delve into how you can tell if you need to have your engine oil changed. These 10 oil change signs range from the common sense to the startling.

Check Your Mileage Sticker

Perhaps the simplest solution to the question of when you should change your engine oil is to just look at the oil changes ticker from your previous service. Most mechanics and oil change shops place a clear sticker on the inside of the wind shield on the driver's side of the car. Here, you'll find the date and/or mileage when you should return. Some also list the oil weight used and more environmentally conscious shops may even tell you about your car's emission statistics.

Dark, Dirty Oil

When oil is new, it's clean and usually a light to dark gold in color (it depends on the weight/thickness). Over time and through use, oil darkens. This is due to heat, but also to the impurities and debris it picks up while being pumped through the engine. Checking the dip stick regularly will let you keep an eye on the color of your engine oil a sit changes over time. If you pull the dip stick and notice that the oil is dark, it's time to change it.

Engine Noise/Knocking

Engine oil's primary job is lubrication. When there's not enough oil, moving parts within the engine do not get the lubrication they need. This allows them to make physical, metal-to-metal contact, which can cause alight tapping or

knocking sound. You may also hear lifters and/or cam bearing noise due to low oil pressure within the engine if the level is low. Engine noise can also occur when the oil is old and has lost its viscosity (ability to lubricate).

Note that this is not the same as ―engine knock ‖, also called pinging, which is caused by an incorrect air-to-fuel ratio. If you hear engine noise, it‘s crucial to check your oil level and conditioned, and have it changed immediately. This is a tell-tale oil change sign. It may be necessary to add oil to the engine to make it safer to drive to the mechanic shop, as well.

Exhaust Smoke

In most cases, your car‘s exhaust will be mostly invisible, although it will have a slight smell to it. Note that gasoline engines produce very little colored exhaust, unlike diesel engines, which produce black, soot-like exhaust. You may also notice a visible cloud produced from your tail pipe during cold weather ― this is mostly water vapor, and it will dissipate as the engine warms to operating temperature. However, if you notice that you have blueish smoke coming from your exhaust, it‘s a sign that there‘s something wrong.

Generally, blue smoke is caused by oil seeping into the engine and being burned along with the fuel. Your engine will be low on oil, as well. There is also the possibility that there is an external oil leak, and the oil is dripping onto the exhaust system. Note that if the exhaust is grayish, it is more likely to becaused by an in correct fuel – to – air ratio, as your engine is burning ― rich‖―too much fuel is being combusted.

You Smell Oil Inside the Car

If you smell oil inside the car, it means just one thing ― you have an oil leak, and it‘s dripping onto a hot part of the engine or exhaust and is burning away. There are plenty of potential areas for oil to leak, including from the following:

- **Oil plug –** This is the drain plug in your engine‘s oil pan. It is taken out during oil changes and replaced. However, if it is not tightened properly, or the gasket has degraded (if present), it may drip oil.
- **Oil filter –** The oil filter cleans particulate matter from the oil as it passes through, and should be replaced at each oil change. If the filter is not seated properly or has deteriorated, it can leak oil. The filter can also be damaged, causing an oil leak.
- **Valve cover gasket –** Oil can leak from around the edges of the valve cover gasket at the top of your engine, and then down the side of the engine. Depending on your engine size, you may have more than one valve cover gasket.

- **Oil sending unit –** The oil sending unit, or pressure switch, is usually located on the back of the engine and can leak oil down the block if the gasket is damaged.
- **Oil pan gasket–** The oil pain gasket seals the oil pan to the bottom of the engine. It can leak at any point around its circumference.
- **Head gasket–**Ahead gasket leak can cause oil to spill down the head of the engine(and usually requires engine tear down tore place).
- **Front/rear main seals –** A leaking front or rear main seal can cause engine oil to leak down the left or right side of the engine, or the front/ back of the engine, depending on drive train type.

Many minor oil leaks are fine to leave as is, as long as your mechanic monitors them over time a teach oil change/maintenance service. However, if you are smelling burning oil in the interior of your car, then the leak is severe, and must be repaired immediately. Failure to do so will result in damage to the engine, or even its destruction. In some cases, it may even lead to a vehicle fire if the oil on the engine ignites.

Oil Check Light on the Dashboard

Your dashboard houses a number of important warning lights, including the check engine light, battery light, and more. It also includes an oil check light. This light is red, and shaped like an oil can with a drip coming from the spout. As you might assume, this is one of the easiest oil change signs to interpret since your car is actually telling you it needs an oil change.

If this light comes on while you‘re driving, pullover as soon a sit is safe and turn off your engine. The light could indicate a couple of different things, but generally comes on when the oil pressure in the engine drops below safe levels. Usually, this is because there is too little oil in the engine. However, it can also mean that the pump/sending unit is faulty and needs to be replaced.

Check the oil level as soon as it is safe. If it is low, you‘ll need to top it off with fresh oil. Once you‘ve added oil, crank the engine and see if the light goes off. If it does, get the oil changed soon and have the mechanic check for leaks that might have led to the low oil condition.

If the light does not go off, it‘s best to call for roadside assistance, as it means that there is insufficient oil pressure in the engine, most likely due to a failed oil pump. Some engine model scan operate with very low oil pressure without sustaining too much damage, but most cannot. It‘s best to play it safe and call for a tow.

Oil Change Reminder Light

New vehicles usually have two oil lights — one is a red warning light discussed above. The other is an oil change warning light. This oil change sign light has nothing whatsoever to do with your oil level or the amount of oil pressure within the engine. It automatically comes on at certain mileage points as a reminder that it is time to have your oil changed. Your mechanic should reset this light at each service.

If it has come on, it means that you have gone beyond your manufacturer‘s recommended service interval mileage, or that the mechanic did not reset the light at your previous service. Check to see if there is an oil change sticker on your wind shield. If there is, compare the mileage written on that with the mileage on your odometer. If the odometer reads higher, then you‘ve missed your oil change window and you need to have it changed soon. If the sticker mileage is higher, then the mechanic forgot to reset the light.

Oil Level Is Low

It‘s important for all car owners to know where their oil dipstick is located, and to check the level on a regular basis. This allows you to keep an eye on oil consumption, color and condition, and avoid problems before they become serious. Ideally, you should check your oil level weekly, but once per month is usually safe.

If you check your dip stick and the oil level is low, it may mean any number of things. First, it‘s considered normal for some engines to use a small amount of oil between oil change intervals. The exact amount differs from automaker to automaker and model to model, as well as with time. For instance, for some Honda Accords made during the 2000s, it is considered normal for the engine to burn up to a quart of oil between oil changes. This oil is not leaked, but burned off.

If the oil is below the safe level on the oil dipstick (some dipsticks use full and safe marks, while others use hash marks to indicate the safe range), you‘ll need to top it off. In most instances, the bottom mark on the dip stick represents the engine being a quart low. If you are with in the mileage for your oil service, you may be fine just topping off.

However, if you are at your oil change mileage or beyond, it‘s important to have your oil changed. It‘s also important to have the mechanic you use check for oil leaks during the service. As mentioned, some oil consumption may be normal, but it may also because by a leaking gasket or other problem.

Excessive Mileage

We rely on our cars to get us to and from work, back and forth from the store, and more. We also rely on them to take us longer distances — your annual vacation trip is a great example. However, long drives put a lot of wear on the engine, and on the engine oil. You should have the oil changed immediately before the trip, and then again once the trip is over. Why, though?

Prolonged use and long periods of time at high temperatures degrade oil more quickly than normal use. The oil will darken more quickly, pick up impurities faster, and lose its ability to lubricate inasmuch shorter amount of time. Changing your oil before and after a long trip ensures that you don‘t inadvertently cause damage to the engine by running oil that‘s lost its ability to lubricate.

If you own a used car, you must be even more diligent regarding oil changes because it's likely that your vehicle already has racked up some miles. It's recommended that as your car's odometer continues to grow larger, you schedule or perform oil changes more frequently and use oil specially-designed for high-mileage vehicles.

Car Stalling

Many modern vehicles are designed with several fail-safes to help protect the engine in adverse conditions. One of this is an automatic shut off when the oil pressure drops to a certain level, or the oil level drops too low (note that this is not true for all cars). This causes the engine to stall and die. However, engine stalling itself is very damaging to the engine, as it could lead to damage to the pistons, head and other components. If your car continues to stall, even after ensuring that it is well-lubricated with fresh oil, perhaps it may be time to think about buying or leasing a new vehicle?

Overheating

Overheating is generally not associated with low oil levels, although it should be. It‘s usually noticed if your coolant is low, but low oil can also cause the engine to overheat. This can occur even if your coolant level is fine. If there is too little oil in the engine, it will continue to heat up because it has no opportunity to cool. This means that the engine coolant has a harder time siphoning off excess heat, and you‘ll notice your temperature gauge start to climb (note that your temperature gauge indicates coolant temperature, not oil temperature).

If you notice your coolant gauge rising in to unsafe levels (yellow or red on the gauge), find somewhere safe to pull over and let it cool. While the engine is cooling, check the oil level. If it is low, it will need to be topped off before driving to a mechanic. You should also check your coolant level, but do not do this until

the engine is completely cool. Hot coolant can explode out of the reservoir or radiator and cause serious burns.
Once the engine has cooled, check the coolant level and to pit off if necessary. Never run your engine if it is overheating, as it can cause serious damage, up to and including cracking the engine block, which essentially destroys the engine.

In Conclusion
In the end, it is vital that you keep a close eye on the oil condition and level in your car. Always ensure that it is being serviced at the right intervals, and that you are using the right type and weight oil for your engine, per manufacturer specifications. Any signs of low oil, low oil pressure, oil leaks or overheating should be addressed immediately. If you feel like you might be the type of person to press your luck with regular Hyundai oil changes, Jim Ellis Hyundai Atlanta offer s a Hyundai Maintenance Protection Plan that will keep your vehicle in tip-top condition.

2. RADIATOR MAINTENANCE

The radiator of a vehicle is one of the cooling devices, the water hose are connected to carry cool water to the engine and return hot water to the radiator, this cooling circle goes on as long as the engine is running the circulation is made possible with help of the water pump radiator checks includes. **Risks of Not Changing Coolant**

Coolant's primary job is to regulate the temperature of the engine, but it has other functions too, including:

- Acting as an anti-freeze agent to prevent the cooling system from freezing up in the winter
- Introducing rust-inhibiting additives into the cooling system to prevent rusting
- Regulating the automatic transmission fluid temperature, which then regulates the transmission's temperature
- Regulating the temperature of the heater to keep the cabin warm

Most manufacturers recommend replacing the coolant at least every 96,000 km, but the intervals are sometimes as short as 48,000 km. They recommend replacing it at these intervals because this is when the rust inhibitors in the coolant begin breaking down. As they break down, corrosion can start forming in the cooling system and turn the coolant from a liquid to a thick slurry.
The slurry reduces the coolant's ability to remove heat from the engine and transfer heat to the heating system, potentially causing the vehicle to overheat or the heater to not work properly.

- Eventually, the slurry can become so thick it blocks the veins the coolant passes through or the radiator, causing even more potential overheating issues, which can lead to engine failure.
- Regularly flushing your radiator. Every 12 months or 30 000 km's a radiator flush and engine coolant replacement will remove the build-up of rust and residue and keep your radiator working properly.
- Maintain the hoses and check for leaks. ...
- Fluid check. ...
- Don't overload your vehicle

3. **BATTERY MAINTENANCE**

Batteries contain electrolyte (acid) and heavy metals like lead and zinc, the battery used on motor vehicle must be charged when it runs down, when the engine is running, the battery is charged by the alternator therefore electrolyte must be properly disposed off and be replaced appropriately. Also you must prevent water from penetrating inside your engine while washing.

4. **THE BODY OF THE VEHICLE**

Maintaining the body is very necessary when washing the car ensure that under the wings (fenders) are properly washed to avoid rust. Rust occurs easily under the wings (Fenders) of the vehicle than any other part of the vehicle.

5. **VEHICLE CHECKS**

Regular Check: A good driver is expected to conduct a regular check of the following part of the vehicle before proceeding on a journey: oil, fuel, light, steering, air vacuum, tyres, wind screen, hydraulic leaks, mirrors, spare tyres, warning device, wheel nuts among others, the following must also be checked on daily basis:

(1) Check radiator water level
(2) Check engine oil level
(3) Check fan belt tension
(4) Check brake fluid
(5) Check battery water (electrolyte) level
(6) Check lights
    (a) Trafficators
    (b) Reverse lights
    (c) Brake lights
    (d) Panel lights
(7) Wiper
(8) Horn

(9) Tyre pressure including the spare
(10) Fuel level in the tank
(11) Engine oil level
(12) Handbrake
(13) Safety belt light
(14) Alternator light (battery)
(15) Overheating
(16) Choke
(17) Check accessories
    (a) Jack
    (b) Wheel spanner
    (c) Fire extinguisher
    (d) Caution triangle
    (e) Tyre wedges
    (f) Spare fuses
    (g) Spare fan belt
(18) Brake fluid
(19) Portable tool box
(20) Torch light
(21) Duster
(22) First and box
(23) Extra fuel fitter
(24) Towing rope
(25) A fuel hose and small jerry can.

WARNING – Never carry fuel in your vehicle trunk.

FAULT DETECTION

(1) Most of the serving and maintenance required for a vehicle can be carried out by the driver himself. The should be able to detect fault that emanates from the vehicle. A fault could arise due to working parts that fails. One fault may lead to another.
(2) A driver who intends to service a vehicle by himself should have a copy of the vehicle manufacture's handbook – or the more detailed workshop manual, which differs from vehicle to vehicle.
(3) He should also possess the correct tools and know where genuine spare parts are kept or can be obtained.
(4) Drivers who, engage in regular maintenance and servicing are to back it up by the knowledge of how the vehicle works to make the vehicle last long.

CAUTION !!!

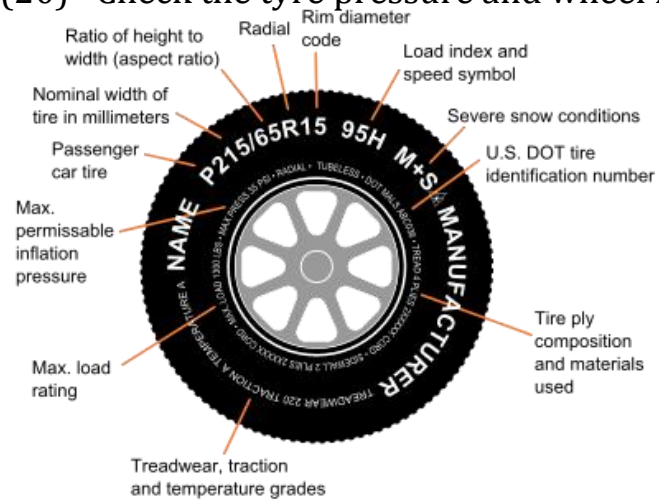
(1) Most vehicles do not take kindly to unskilled adjustment

(2) Given the right guidance and using the right tools, these are surprising numbers of jobs any owner can tackle with confidence.

WHEEL CHANGING

Before jacking the vehicles also observe the following precautions.

(1) Park your away from the thoroughfare
(2) Make your passengers wait in a safe area AWAY from the vehicle
(3) Switch on the hazard lights to alert other road users.
(4) Place your caution triangle some few meters in front and behind the vehicle, on the road, to equally alert other road users
(5) Apply the handbrake and engage first gear in the gearbox.
(6) Turn off the starter switch and remove the key.
(7) Never jack the vehicle with passengers inside, or with a caravan or trailer connected.
(8) Never work beneath the vehicle with the jack as the only means of support.
(9) The Jack is for changing wheel only
(10) Choke one of the road wheels, diagonally opposite the one to be removed.
(11) Use the wheel brace or spanner to slacken the wheel nuts halt a turn anticlockwise.
(12) Jack and raise the vehicle until the tyre is clear off the ground
(13) Remove the wheel nuts and the wheel.
(14) Lightly oil or grease the wheel studs to assist in wheel replacement, ensuring that no oil or grease comes into contact with brake components.
(15) Fit the spare wheel and lightly the wheel nuts, ensuring they are firmly seated.
(16) Do not fully tighten whilst the tyre is clear of the ground
(17) Lover the vehicle and remove the jack and the wheel clock.
(18) Fully tighten the wheel nuts
(19) Do not over tighten by suing the fool pressure or extension bars on the wheel brace as this, over-stress the wheel studs.
(20) Check the tyre pressure and wheel nut torque at the earliest opportunity.



DRIVERS MUST NOTE THE FOLLOWING WHILE CHANGING WHEELS

(1) Ensure that you are familiar with operating the jack before using it to raise a vehicle.
(2) Ensure the jack is positioned on firm, leveled ground
(3) Ensure that the space under and around the vehicle is free from obstruction as it is lowered
(4) Only jack the vehicle using the jack location points provided on the vehicle or personal. Injury could result.
(5) When fitting wheel, ensure that the mating faces of the hub and wheel are clean and free from rust.
(6) An accumulation of dirt or rust could cause the wheel nuts to become loose and result in crash.

CHAPTER 8

SAFE DRIVING AND ROAD TRAFFIC LAWS

In this topic, we shall be looking at the following objectives:

1) Meaning of Safe Driving
2) Functions of a Driver Behind Steering Wheel
3) Road Traffic Laws
4) The federal Road Safety Commission (Establishment Act. 2007)
5) Notice of Offense Sheet
6) Federal Highway Act
7) The National Road Traffic Regulation 2012
8) The Police Act
9) The Nigeria Highway Code

SAFE DRIVING AND ROAD TRAFFIC LAWS

Crashes do not just happen. They are as a result of traffic violations. A critical look at the causes of road traffic crashes reveals that the two primary factors are the driver and the vehicle. The driver's reaction to the vehicle or road condition may lead to the occurrence of crashes.

The challenges of the Chaotic Nigeria Road Traffic situation, increase in the number of vehicle, the increase in the number of both trained and untrained drivers and increase in road traffic crashes are factors necessitating the introduction of laws and regulations guiding the use of the road.

MEANING OF SAFE DRIVING

Being a safe driver means **being alert, always driving to the conditions of the road environment and being ready to take action at any time**. Whether you be an experienced, older or new driver, a passenger, bike rider or pedestrian, read on for tips for keeping everyone safe on the road

If you want to increase your chances of staying safe on the road, review these . No matter how skilled of a driver you are, it's a good idea to reflect on the basics of traffic safety from time to time just to make sure that you are being careful enough to keep yourself - and other drivers and pedestrians - as safe as possible.

Safety Tips for SAFE Driving

Safety is something that drivers should keep in mind at all times. After all, when you are operating a motorized vehicle, you have a responsibility to do your part to keep the roadways safe for yourself, other drivers, passengers, and others who may be affected by traffic accidents.

1. **Stay Alert** - Actively pay attention to your actions and those of the drivers around you when you are driving. Create allowance for other road users. The vehicle may belong to you, but the the road does not belong to you.

2. **Avoid Assumptions** - Don't make the mistake of assuming that other drivers are going to do or what you think they should do. A good drivers must always anticipate dangers and plan for it immediately. The worst mistake is to believe that other drivers knows what they are doing.

3. **Use Turn Signals** - While you can't depend on others always signaling their intentions when driving, you can certainly control whether or not they have realistic expectations for your actions. Always use your turn signals in advance of making a lane change or turning. Atleast 50/ 60meters or two car length to the entrance.

4. **Buckle Up** - Wearing your seat belt is an essential safety tip for drivers. Not only are you more likely to get injured in an accident if you aren't wearing a seat belt, you can also be fined for failing to do so. Habit of not wearing seat belt is suicidal and can lead to untimely death.

5. **Follow Traffic Signals** and obey.- Pay close attention to traffic light, obey signs and traffic lights. Red means to stop, yellow means get ready to stop at an intersection or get ready to move, while waiting for the green. The green light means go if the road is clear. Observation and patience is required at intersection controlled by traffic light. You are expected to obey traffic light, even when to traffic officers are not available for control.

6. **Respect Pelican Lights** - Remember that the pelican light is to notify drivers to slow down and prepare to stop. A pelican traffic signal should not be viewed as a time toignore and to rush through an intersection before the light turns red.

7. **Come to a Complete Stop** - When you see a stop sign or a red light, it's important to bring your vehicle to a complete stop, even if you think no other vehicles are coming.

8. **Do Not Text and Drive** - It is never acceptable to send text messages when operating a motor vehicle. It is a distraction to be mind and sight off the road

9. **Obey Speed Limits** - When driving, it's important to stick to the posted speed limit at all times. The restrictions placed on vehicle speed are not established arbitrarily. Rather, they are carefully selected to maximize safety for drivers and for individuals in the homes, businesses, and other organizations in the areas where roadways are located. The acceptable speed limit on the Nigeria road. The following speed limit is applicable to nigeria road.

- Private /commercial vehicle in built up area 50km/hr
- Highway commercial 80km/ph and private 90km/
- Express road commercial 90km/hr and private 100km/hr
- Towing vehicle 45km/hr

10 Make Adjustments for Weather-When the weather is less than perfect, such as rainy, snowy, or foggy conditions, use extra precautions when driving and follow guidelines for staying safe in the particular situation you are facing. In the rain the road may be slippery, therefore drivers are advised to be careful, driving in the middle of the road is more advisable. In the snow, when the visibility is less than 100m, deep headlight should be used and if the road ahead is completely invisible, park by the kerb with the two flasher on, to indicate to other drivers.

11 Exercise Patience - Many accidents are caused by impatient drivers who are rushing to get from point A to point B. While time is certainly a valid consideration when traveling, safety is even more important. After all, if you are involved in an accident you'll certainly experience more of a challenge arriving at your destination on time than if you simply exhibit patience while driving.

12 Be Predictable - Don't make sudden stops or lane changes. Instead, take care to ensure that other drivers are likely to be able to predict your actions to

maximize safety. Use your turn signal properly and communicate to other driver at every given time your intentions.

13 Never Drive Under the Influence Alcohol or drugs - It's essential to avoid operating a vehicle if you have been drinking, taking certain types of prescription or non-prescription drugs, or are otherwise impaired.

14 Yield Right of Way - When other drivers has the right of way, be sure to yield to them. Also, don't make the mistake of assuming that everyone else will yield to you when they should. Regardless of who has the right to go, yield if it seems that the other driver may not be observing standard practices for yielding. The drivers going straight have the right of way before those joining. At junction yield to expose road users and articulated vehicles.

15 Know Where You Are Going - Plan your travel route ahead of time so that you aren't struggling to figure out where to go while you are operating a motorized vehicle.

16. Extra Careful with parcked Vehicles or Objects - When passing vehicles that are stopped on the side of the road, move over to get out of the way if the way is clear for you to change lanes. If changing lanes is not possible, slow down while passing stopped vehicles.

17. Avoid Distractions - Sending text messages isn't the only dangerous distraction that drivers need to avoid while operating a vehicle. Changing CDs, using cell phones, eating, and interacting with passengers are just a few examples of the types of distractions that you should take care to avoid when driving.

17 Use Headlights and Other Lighting When Needed - Headlights aren't just necessary at night. When you are driving in the rain or fog, turning on your headlights can play an important role in keeping you - and those around you - safe on the road. Also other lighting such as parking, hazard, low beam, high beam, flashing e .t .c must be use accordingly.

18 .Share the Road - Remember that you are not the only driver on the road. An important safety trip that everyone needs to follow is the need to share the road with others graciously, recognizing that all drivers deserve to be treated with respect.

19. **Obey road signs and marking**: Always know your road signs and markings and their interpretations. This include warning, mandatory,prohibitory and informative signs. Also major road markings like, overtaking and non-overtaking lines, stop lines.

20. Observation and anticipation: keep in mind that the road is full of both offensive and defensive drivers, watch out for offensive, aggressive, tailgaters and impatience drivers. They pose great dangers to you and may cause accident.

Proper Vehicle Maintenance - Take care to ensure that your automobile stays in good working condition. This includes keeping fluids topped off, performing schedule engine maintenance, making certain tires have plenty of air, and ensuring that the vehicle's exterior lights are functional at all times.

Defensive driving, on contrary to the seemingly obvious conclusion, can save you just as much time as money and, more importantly, keep the roads safer for everyone. It will help you navigate in most road and traffic conditions and anticipate the possibility of a mishap.

City driving is also a major source of stress, especially during rush hour. Growing cities and suburbs have resulted in an increase in the number of people who have to use a car to get around. Following these steps will also make driving a more enjoyable experience.

Defensive driving is more about common sense than anything else. It is easy to remember most of what is written here, but then, 'the roads are full of idiots'. So, the more people driving defensively, the safer it will be out there.

RESPECT THE RIGHT OF WAY OF EVERYONE

If you spot a vehicle in a hurry, do not be obstinate and yield the right of way even if you are legally right in refusing. While the other driver might be being a bully in claiming you give way, it's better to let him through. Do not block the path of the vehicle by moving in front of it or impede its passage in any way. Doing so is dangerous and increases the risk of an accident.

Also, weaving in and out of traffic is a serious safety threat. Always remember, when it comes to driving, it's reaching your destination safely that is most important.

DO NOT EXCEED THE SPEED LIMIT

Driving over a given speed limit is not only illegal, but also dangerous. Driving at 60kmph on a road where the limit is 50kmph might save you 20 minutes, but it also increases the chances of an accident.

The faster you are moving, the longer it takes for the car to do your bidding when you apply the brakes. It also reduces the time you have to react to the unexpected, such as a car out of control or an animal crossing the road. The sheer physics of a collision at high speeds should be enough deterrence. The greater transfer of energy resulting from the higher momentum can cause horrific injuries.

Also, you will be booked by the police if you are caught speeding, which will include a fine the first time (up to Rs 1,000) and a more permanent punishment for repeat offenders.
Therefore, choose a speed matching the rest of the traffic as closely as possible without exceeding the speed limit. If the rest of the traffic is moving at a pace faster than you like, keep to the lane on the left and stay out of the way of the faster vehicles. If you need to overtake a vehicle moving slower than you are, do so from the right. Make your intentions clear using the indicators before overtaking.

PAY ATTENTION TO THE ROAD
"I never saw him!" is the most common excuse used after an accident. But come on, it wasn't that the other vehicle (or person or electric pole) was invisible.

Numerous accidents happen because a driver does not pay attention to what is happening on the road. Any vehicle, immaterial of its size, can be the cause of an accident. Also remember that you cannot rely on your fellow drivers to follow the rules and keep you safe. So stay alert and ensure that you have plenty of room to manoeuvre your vehicle out of a potentially dangerous situation. It would help if you don't use your mobile phone or listen to music on full volume.

Try to anticipate what the other drivers might do in the situation, especially on open roads or when there is heavy traffic. It's always better to stay wary. Be careful when approaching traffic signals, breaks in dividers or service roads. Hasty motorists tend to join the main road without checking the flow of traffic. Also, on a busy road, such as a commercial centre, watch out for cars pulling out from parking. Look out for gaps in the lines of traffic for space to take evasive action. Slow down if you see the traffic in front of you bunching up. No point in adding to the melee. A little patience will help in clearing the jam.

ALWAYS REMEMBER TO WEAR THE SEAT BELT

The seat belt is the most important safety device in your car. A seat belt might appear to be insignificant, but it can save your life. The force and sudden movement on collision can fatally injure a person (ribcage, lungs and heart against the dashboard or steering wheel) or even fling drivers out of the car if they're not strapped in.

Seat belts also help in cutting down movement while driving on bumpy roads. If you have a small child in the car, use a baby seat and fasten it using a seat belt.

DO NOT DRIVE IF YOU ARE STRESSED OR UNWELL

If you think you are distracted, stressed, fatigued or unwell and it will affect your judgment while driving, you should not get behind the steering wheel. Any of these can slow down your reaction time and driving in such a state is unwise.

Being overworked, stressed or tired increases the chances of you falling asleep at the wheels. If it's a long drive and you feel tired, pull over to the side of the road and sleep for a while.

It goes without saying that consumption of alcohol is a serious impediment to making the right choices and it is very dangerous to drive inebriated. If you are going to a party where you are likely to consume alcohol, make sure someone who does not drink is the designated driver or arrange for a taxi. Driving under the influence of alcohol is a punishable offence, including the possibility of cancellation of your licence or even jail time.

Also, it would be safer not to drive if you are unwell. A high fever or an injury can be disorienting, resulting in an error of judgment.

SLOW DOWN ON WET ROADS AND IN BAD WEATHER The most sensible thing to do in adverse weather conditions such as heavy rainfall or fog is to slow down. Driving at high speeds in heavy rain could lead to your car aquaplaning (rise up on a thin film of water between the tires and road so that there is no more contact with the road).

Make sure that your car tyres have the right air pressure because overinflating tyres reduces the area of contact with the road, resulting in loss of rolling friction on wet surfaces. If your car tyres are overinflated, release some air.

Similarly, visibility is reduced significantly in a dense fog and judging the distances between vehicles becomes difficult.

In both cases-heavy rain and fog-slowing down is the safest option. If the fog is very thick, drive slowly along the divider or road markers to have a point of reference. Do not try to overtake in such conditions.

KNOW THE BLIND SPOTS

Remember that you have a few blind spots around your vehicle. The area behind the pillars of the car and at the back are the usual blind spots. Always be cautious when moving in these direction, such as when you are changing lanes or backing out of parking. Looking into your rear-view mirror is not enough. Watch out for approaching traffic from the sides, which a blind spot on the overhead mirror, in the outside mirrors.

On roads that have higher speed limits, such as highways, traffic from the rear approaches very quickly. When there are large vehicles such as trucks and buses

on the road, ensure that you maintain enough distance for your car to be visible in the rear-view and outside mirrors of the vehicle in front of you. In fact, tailgating any vehicle is a risk. So maintain a reasonable distance between your car and the vehicle in front.

Backing up is always tricky. Have a quick look around for anything in your way first. Be especially careful if there are children playing around the vehicle. Defensive driving might seem dull, but safety should be the paramount consideration on the road.

A driver's licence is a privilege – but no guarantee that the owner will be a safe driver! Drivers need to work on their driving, improve their skills all the time and seek to gain awareness on those aspects that will enhance their safety and the safety of others on the road.

The major threats to road safety include a lack of self-respect and disregards for the rules of the road.

The Automobile Association (AA) advises that all motorists give way to better road manners. The following are some valuable advice on road safety manners and attitude:

- A motorist is not justified in keeping to the right-hand lane and obliging traffic to overtake him on his left simply because he is driving at the legally-allowed maximum speed. Another motorist may have a valid reason for exceeding the limit, and to obstruct him unreasonable may lead to the building up of a dangerous situation in which bad temper may overcome good judgment.
- In an emergency switch on your emergency hazard lights as well as your headlights and drive at a safe speed. Obey the rules of the road and don't drive recklessly.
- Although driving in the emergency lane during daylight hours is permitted under certain provisos, following traffic has no right to force traffic ahead to move across the yellow line to allow overtaking - it may be courteous to move over but it places the onus on you to ensure that it is safe to do so.

FUNCTIONS OF A DRIVER BEHIND STEERING WHEEL

SIPDE SYSTEM

- Search
- Identify the relevant clues:- for example, Azare or Sokoto axis, where roads stretch without trees and you can see all around you, also where children

are tending animals and there is a tendency for them to jump into the road without looking, watching and slow down.

- Predict (anticipation)
- Decide (what to do)
- Execute your decisions

SMITH SYSTEM

The system specifies the following for drivers:

- Aim high and look ahead, not down
- Keep your eyes moving
- Get the big pictures
- Make sure others see you and you see others
- Leave yourself a way out or margin of safety.

RESPONSIBILITIES OF A DRIVER

Yes, you own your car. But you do not own the road. One foolish mistake of a driver can result in a serious fatal accident which can take a lot of lives. This is the more reason why you have to always be aware of the responsibilities of drivers in road safety.

As road accidents increase at astronomical rate stemming from drunk driving, over speeding, improper vehicles, flouting traffic regulations and many more, drivers must become more attune to their responsibilities in road safety.

To get going, the following are some key responsibilities of drivers in road safety.

1. Ensure The Vehicle is Road Worthy

Driving faulty and poorly maintained vehicle is one of the major causes of road accidents. It is even amazing that many drivers know for sure that their vehicle needs maintenance, but they put the vehicle on the road causing serious havoc to themselves and pedestrians. Ensure your vehicle is road worthy, don't over load to exceed the required weight limit for the car.

2. Drive at Reasonable Speed

Over speeding kills! There's no doubt about that. And the ways to control over speeding is by driving at a reasonable speed and ensure you have installed a speed governor for your car. Speed governors are special devices that help restrict and limit vehicle speed so as to avoid over speeding.

3. Be Alert and Self Aware of the Environment When Driving

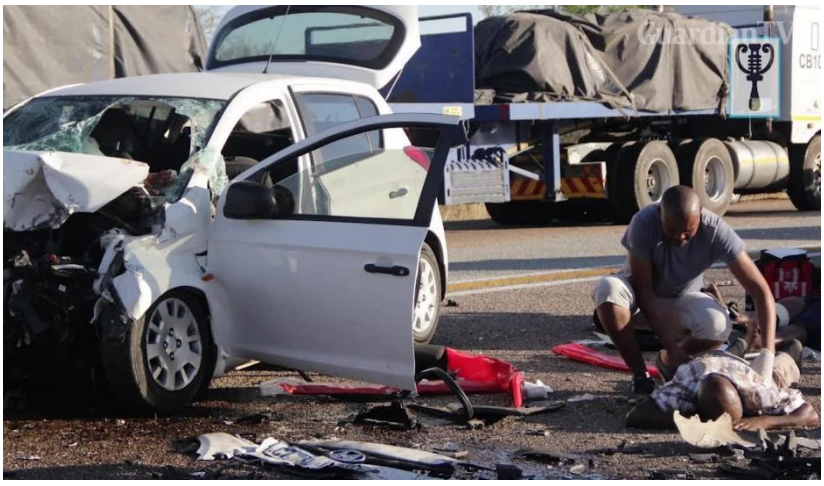
It's not enough to focus on the road. You also have to be alert, aware and attentive to the environment. You have to be aware of your vehicle sounds, pedestrians walking by the street, music jamming, other vehicles moving, other driver's signals and many other things. It may not your mistake, but another person's mistake that may most likely result in a road accident.

4. Observe Traffic Regulations

One of the responsibilities of drivers in road safety that must be well noted is observance of traffic regulations. For many reasons such as lateness, pressure, stress and many others, drivers flout road traffic regulations which often culminate in road accidents. Simply observe traffic regulations and avoid road accidents.

5. Parking and Passing Unauthorized Routs

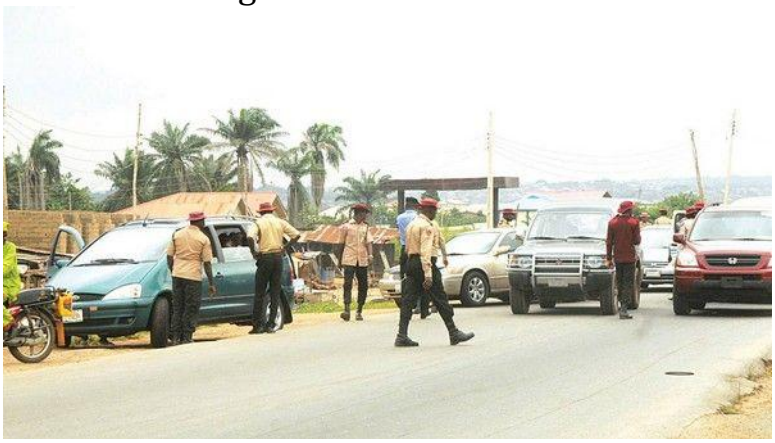
Many drivers are culprits in parking at the wrong places. They just park anywhere and anyhow, forgetting that they may be exposing themselves or other drivers to road accidents: double parking, parking on the road and many others. It is also important to always park well and also avoid taking the wrong routes when driving.



ROAD TRAFFIC LAWS

The main objective of traffic laws is to ensure that the right person drives the right vehicle, in the right manner. So the driver must be qualified and the vehicle road worthy.

To achieve this main objective, the various traffic laws (Road Traffic Act and the FRSC establishment ACT) have created many offence attracting various legal sanctions. All instructors and drivers are therefore expected to be familiar with road traffic rules and regulations including the Nigeria Highway Code which will help them to understand the legal implications of different driving conditions, habits and the general conducts and behaviours of driving on the road.



FUNCTION OF FEDERAL ROAD SAFETY CORPS

To assist the FRSC, different departments help take charge of distinctive issues, in which the VIO and VIS are of great importance.

FRSC is responsible for up to 22 issues around Road safety in Nigeria

There are total 22 duties of FRSC announced by Nigerian government. As this is published by the authorities, will cite here exactly the list of FRSC functions:

- Making the highway safe for motorists and other road users.
- Recommending works and devices designed to eliminate or minimize accidents on the highways and advising the Federal and State Governments

including the Federal Capital Territory Administration and relevant governmental agencies on the localities where such works and devices are required, and

- Educating motorists and members of the public on the importance of discipline on the highway
- Preventing or minimizing accidents on the highway.
- Clearing obstructions on any part of the highways.
- Educating drivers, motorists and other members of the public generally on the proper use of the highways.
- Designing and producing the driver's license to be used by various categories of vehicle operators.
- Determining, from time to time, the requirements to be satisfied by an applicant for a driver's licence.
- Designing and producing vehicle number plates.
- The standardization of highway traffic codes.
- Educating drivers, motorists and other members of the public generally on the proper use of the highways.
- Giving prompt attention and care to victims of accidents.
- Conducting researches into causes of motor accidents and methods of preventing them and putting into use the result of such researches.
- Determining and enforcing speed limits for all categories of roads and vehicles and controlling the use of speed limiting devices.
- Cooperating with bodies or agencies or groups in road safety activities or in prevention of accidents on the highways.
- Making regulations in pursuance of any of the functions assigned to the Corps by or under this Act.
- Regulating the use of sirens, flashers and beacon lights on vehicles other than ambulances and vehicles belonging to the Armed Forces, Nigeria Police, Fire Service and other Paramilitary agencies;

- Providing roadside and mobile clinics for the treatment of accident victims free of charge.
- Regulating the use of mobile phones by motorists.
- Regulating the use of seat belts and other safety devices.
- Regulating the use of motorcycles on the highways.
- Maintaining the validity period for drivers' licences which shall be three years subject to renewal at the expiration of the validity period.

Accordingly, the FRSC has the power to arrest or prosecute any person who is suspected of violating traffic laws.

These two forces, Vehicle inspection officers and Vehicle inspection services work closely together to support FRSC and Ministry of Transportation.

Their duties include:

- Inspecting and issuing certificates for vehicles' road worthiness
- Maintaining the sanity on Nigerian roads and highways
- Training and testing drivers for driver's license application
- Testing riders applying for Riders card
- Educating drivers through public lectures and seminars related to traffic laws
- Inspecting vehicles involved in road transport accidents
- Certifying driving schools

THE FEDERAL ROAD SAFETY COMMISSION(ESTABLISHMENT) ACT. 2007

The Federal Road Safety Commission was established as the lead agency in road traffic matters in 1988, by degree No. 45, as amended on 1992. The degree was

replaced and the Federal and Safety Commission (established) Act, 2007, was enacted.
On every road there are road users such as motorists, pedestrians, cyclists, motorcyclists, passengers and animals

As a road user, it is expected that the road is used in accordance with the rules and regulations, Every road user should be disciplined. careful and considerate to others, to ensure safer roads. thereby avoiding road crashes and or arrest and prosecution.

In the exercise of the functions conferred by (510(4) of the FRSC Act, 2007 establishment), members of the corps shall have the right to arrest ad prosecute any person reasonably suspected to have committed any traffic Offence(s).

It is therefore an offence to:

1. Be on any road without any lights or faulty lights, signs or reflectors or wrongful use of signals
2. Obstruct any section of the road with vehicles or in any other way that may affect free flow of traffic
3. Use a restricted road where it Is marked "one way" or "no entry"
4. Disobey speed-limits erected at road construction areas or any other road
5. Drive a vehicle without a valid learner's permit; driver's license or any other permit required by law
6. Drive a vehicle without a valid vehicle license of identification mark being displayed
7. Overtake another vehicle wrongfully
8. Disobey traffic light signals
9. Disobey or disregard road signs or pavement markings
10. Drive a vehicle, a two or three wheel cycle on any road in a reckless or negligent manner that will be dangerous to other road users.
11. Drive a vehicle or motorcycle with forged vehicle papers
12. Drive a vehicle or motorcycle under the influence of drugs or alcohol
13. Drive a vehicle or motorcycle or any mechanically propelled engine that would result in the damage to any public presence, street light, traffic lights, road signs etc
14. Engage in any act of commission or omission by motorists which may constitute hazard to other road users
15. Remove from a vehicle, the sign, "Do not move"
16. Use a road that is under construction
17. Fail to move over to the slow lane to free up traffic flow
18. Uncover gravel or other unstable materials with tarpaulin or strong plastics to stop it spilling on the road
19. Cover number plates at the front and rear sides the vehicle

20. Load a vehicle above the weight or number of passengers required by law
21. Drive a vehicle with projected load
22. Obstruct a marshal in the performance of his duty
23. Drive a vehicle with damaged or shattered windscreen
24. Drive a vehicle with worn tyres or without spare tyre
25. Drive a vehicle that is mechanically deficient
26. Drive a vehicle without fire extinguisher
27. Assault a marshal on duty
28. Corrupt a marshal on duty
29. Fail to report at designated place by a traffic offender
30. Drive a vehicle that emits excessive smoke
31. Drive a commercial vehicle without a passenger manifest
32. Use your GSM phone while driving
33. Driver under 18 years of age
34. Ply the road by commercial drivers and conductors without badges
35. Ply the road without side and inner rear mirrors
36. Smoke or eat while driving
37. Drive a double-decker bus in Nigeria
38. Fail to use your headlight s during inclement weather
39. Fail to signal when changing lanes, making a turn or pulling in front of another vehicle
40. Fail to properly secure under-aged children in an approved school safety seat or booster seat
41. Travel in a bed of a pick-up truck by any person
42. Fail to use belts while driving
43. Fail to pay any prescribed fine or other fees under the law
44. Provide incorrect address under the law
45. Reject accident victims by hospital medical personnel
46. Ride a motorcycle without a crash helmet properly strapped to the head and fastened under the chin47. Drive with one hand
47. Drive with one hand

- By Section 10(4) of the FRSC (establishment) Act, 2007 members of the Corps are empowered to arrest and persecute persons reasonably suspected of having committed any traffic offence and sense such persons with court process or notice of offence sheet.

- A Traffic offence is an act or omission on the part of the motorists and road users punishable by traffic laws.

- Section 20 and 21 of the FRSC (establishment) Act. 2007. Causing death by dangerous or reckless driving. A person who causes the death of another person by driving dangerously or recklessly is liable on conviction to seven years imprisonment with no option of fine. However if any person driving

dangerously or recklessly without causing death of another person, he shall be liable on conviction to a fine of fifty thousand naira or two years imprisonment or both fine and imprisonment.

- Section 23 and 24 of the FRSC (Establishment) Act. 2007.
  Driving without licence or forged vehicle papers. It is an offence under these sections to drive without a license, or driving with forged license. A fine of ten thousand naira to the case of invalid license and twenty thousand naira in the case of forged documents.

  The driver instructors must note that photocopies of license are not acceptable. The original must be presented on demand or within 24 hours of arrest by an FRSC Officer.

- Section 25 of the FRSC Establishment Act. 2007
  Section 25(1) provides that drivers or persons involved in an accident shall immediately or as soon practicable report the accident to the nearest FRSC Office or police station for appropriate action.

  (2) – Failure to report accidents on the highway attract a penalty of twenty thousand naira.

- Section 26 of FRSC Establishment Act. 2007
  Overloading: It is an offense under this section FRSC (establishment) Act. 2007 to drive a vehicle on highway with a load exceeding the capacity prescribed for that class or, type of vehicle and a driver is liable on conviction on a fine of ten thousand naira.

NOTICE OF OFFENCE SHEET
PURSUANT TO SECTIONS 10(4), 28(2) OF FRSC (ESTABLISHMENT) ACT. 2007 AND REGULATION 143 OF NRTR, 2012

S/N	TICK INFRINGEMENT	CODE	POINTS	PENALTY (₦)	CATEGORY
1.	Assaulting Marshal on duty	AMD	10	10,000	2
2.	Attempting to corrupt Marshal	ACS	10	10,000	2
3.	Caution sign violation	CSV	3	3,000	3
4.	Construction area speed limit violation	CAV	3	3,000	1
5.	Dangerous driving	DGD	10	50,000	1
6.	Do not move violation	DNM	2	2,000	1
7.	Drivers licence violation	DLV	10	10,000	2
8.	Driving drag/Alcohol influence	DUI	5	5,000	2

9.	Driving with worn out tyre	TYV	3	3,000	1
10.	Driving with expired tyres	EWT	2	2,000	3
11.	Excessive smoke emission	ESE	5	5,000	1
12.	Failure to cover unstable material	FCM	5	5,000	1
13	Failure to fix rod flog on load	FFF	3	3,000	1
14	Failure to make over	FMO	3	3,000	1
15	Failure to report road crash	FRC	10	20,000	1
16	Fire extinguisher violation	FEV	3	3,000	3
17	Inadequate construction warning sign	ICW	-	50,000	1
18	Light/sign violation	ISV	2	2,000	2
19	Medical personnel / Hospital rejection	RCV	-	50,000	1
20	Operating mechanically defeat vehicle	MDV	5	5,000	1
21	Obstructing Marshal on duty	OMD	3	3,000	2
22	Operating vehicle with forged document	OFD	10	20,000	2
23	Overloading	OVL	10	10,000	1
24	Passengers manifest violation	PMV	10	10,000	2
25	Road obstruction	ROB	5	5,000	1
26	Road marking violation	RMV	5	5,000	1
27	Route violation	RTV	10	10,000	1
28	Seat belt violation	SUV	5	5,000	1
29	Speed limit violation	SIV	5	5,000	1
30	Unauthorized removal with road sign	UTS	5	5,000	1
31	Underage driving	UDR	-	10,000	1
32	Use of phone while driving	UPD	4	4,000	1
33	Vehicle licence violation	VLV	3	3,000	2
34	Wrongful overtaking	WOV	3	3,000	1
35	Learners driving regulation violation	LDV	10	3,000	1
36	Child sitting position violation	CPV	6	3,000	1
37	Driving right-hand steering vehicle	DRV	10	3,000	1

38	Other offenses/violations	OFV	2	3,000	-

NOTE: Custody on Impounded Motor Vehicle and Motorcycle/Tricycle is ₦200 and ₦100, respectively per day payable after initial of hours grace.

FEDERAL HIGHWAY ACT

The Federal Higway Act made provisions for the control of Federal Highways at Section 1-4 the major provision on this segment is power of the minister to erect toll gates and to acquire land for highways. Above all, the Federal Highways from 1st June 1971 were placed under the management, direction and control of the ministry charged with responsibility for roads that is the minister of works.

The Act contains provision on various road traffic offences from Section 5-20. The most regular offenses are reckless or dangerous driving under the influence of drinks and drugs, offences relating to licences and identification marks for vehicles, overloading, power of police officer to retain driving licenses and miscellaneous matters.

It is important to note that almost all by these offences have been taken care of in the FRSC (establishment) ACT. 2007.

THE NATIONAL ROAD TRAFFIC REGULATION 2012

The national road traffic regulation 2012 was enacted under the powers granted by section 5 of the Federal Road Safety Act Cap 141 laws of the Federation of Nigerian (LFN) 1990. The regulation is a road map on issues relating to traffic and all compassing.

The NRTR 2012 is divided into 35 Parts as follows:-

(1) Objectives
(2) Registration
(3) License for vehicle
(4) Special Trade License
(5) Establishment and regulation of driving schools
(6) Vehicle Identification Numbers
(7) Learner's Permit and Drivers License
(8) International Convention Provision
(9) Drivers and Conductors Registration and Badges
(10) Taxes, Stage carriage, Omnibuses and Motorcycles for hire
(11) Use of School Buses
(12) Use and Construction
(13) Speed Limits
(14) Use of Sirens
(15) Traffic signs
(16) Trafficators

(17) Rules of road crossing
(18) Parking of Vehicles
(19) Damage to Public Roads
(20) Hindering or obstructing Vehicles on Public Roads
(21) Rules of Driving and General Duties of drivers of vehicle or passengers on public roads.
(22) Removal of vehicles
(23) Predestines and Pedestrians crossing
(24) Driving under the influence of alcohol or drugs
(25) Reporting Road Crashes
(26) Special provisions relating to expressway
(27) Use of bicycles on public roads
(28) Provisions relating to exempted bodies
(29) Operating of towing vehicles
(30) Miscellaneous motor traffic regulation
(31) Use and operation of ambulance services
(32) General Provisions

THE POLICE ACT

Under the Police Act, the police is empowered to present and detect crime, apprehended offenders, preserve the law and order, protect life and property, enforce all laws and regulations with which they are directly charged and shall perform such other duties within or outside Nigeria as may be required of them under this or any other Act.

Under PART II Section 59 of Police Act. Traffic warden service was established. The road traffic wardens are empowered to discharge functions normally undertaken by the Police in connection with the control regulation, or the enforcement of the law relating to road traffic and shall in that connection act under the direction of the police. Notwithstanding, the provision of sub-section 5, sub-section 6 also employs the traffic warden service to –

- Control and direct motor traffic on highway
- Assist pedestrians to cross the roads
- Control vehicles, stopping or packing in authorized place.

THE NIGERIA HIGHWAY CODE

Ignorance of the law is not an excuse – a driver who cannot read or write has no business in driving. The law expects a driver to understand what should be done at road junctions and inter-changes. The law expects a driver to understand that there are other roads users including pedestrians, the cyclists, the motorcyclists, children and even animals. The driver is expected to know how to obtain a driver license, the driver is expected to know how to obtain a leaner's permit, drivers license and how to renew the driver's license.

It is also in the position of the law that to qualify for a drivers license there must be a vision acute test etc.

Vehicle registration and other routine inspections for road worthiness and vehicle license requirements are all contained in Nigeria Highway Code.

DRIVING SCHOOL AND DRIVER INSTRUCTORS: are to ensure that all drivers are familiar with code, organize classes for them on the code and encourage student to attend classes for them to be a safer driver on the road and be acquainted with other rules and regulations.

CHAPTER 9
DRIVERS/CUSTOMER CARE IN DRIVING

The present situation of road crash records shows that in practice all road crashes are caused by human errors and mainly by the drivers. Studies also reveal that over 60% of licenced drivers not well trained, however regular training and re-training of to be and licensed drivers will lay a solid foundation for ensuring safe driving cultures and a better client/customer care will be achieved.

i. **Driver's Customer/Client:** The driver's customer or client is a person or group of person that a driver of a vehicle carries from point A to point B safely. This may include :
   - Commercial travellers (Passengers)
   - Private individuals
   - Companies
   - Owners of goods/product conveying vehicles.

ii. **Customer's Expectations:** Generally a customer to a driver is who can also be referred to as a passengers, expects so much from the driver.

- He expects to be conveyed to his destination in a safe comfortable vehicle in good time
- He expects proper handling of his luggage;
- He expects to be driven at the comfortable and acceptable speed limits;
- He expects the driver to be polite, friendly and to exhibit caring attitude towards him:
- He does not expect the driver to over load his vehicle. etc
- He expects prompt responses to his requests;

He expects flexibility in the travel options available to him; etc. can you help a driver when you are a passenger?

What the drivers expect from the passengers

1. Be quiet and alert.
2. Don't create distractions for the driver.
3. Offer to help navigate.
4. Do not tolerate distracted driving. If you are a passenger in a car with a distracted driver, say something!

iii. Communication Skills: Broadly speaking, communication touches every sphere of human activity because it is occasioned by mans need to interact with his fellow-man he manifests in symbolic and verbal forms. Therefore, communication is defined in various ways;

- Communication is defined as a process by which one person (or group) shares and imparts information to another person (group) so that both clearly understand one another.
- Communication serves as an instrument of social interaction which helps us to understand ourselves, keep in touch with other people, to understand them and to predict their response to situations.
- In business and industry, communication helps to orient workers to one another and to the goals of organization and it is the means by which such goals are pursued, attained_ sustained and improved. It is also an act of sending messages from a sender to a receiver in an. attempt to create shared understanding. In order to do this effectively, it requires very good skills, which include listening, observing, speaking, questioning, analyzing and evaluating. A driver no matter the level of academic attainment should therefore be able to communicate effectively with his clients.

It entails body language, Para language and distance. Conveying ideas, information attitude and feelings by the way something is said rather than by

what is actually said (i.e. tone and countenance e.g. hissing conveys scorn or dissatisfaction, qualities of voice like pitch, volume, resonance, rhythm as well as vocal and characteristics like sighing, laughing, belching, yawning, groaning, yelling and whispering says a lot about the speakers attitude, feeling and even his status). The distance aspect of communication is as a result of gap created between people. This is called personal distance.

Interaction: This is concerned with the exchange of messages between senders and receivers. If the receiver is willing to participate, he sends his response to the initiator.

Communication also involves the use of language to express ourselves, to get our ideas across, and to connect with the person to whom we are speaking. When a relationship is working the act of communicating is flowing relatively well while when a relationship is not working, the act of communicating can be as frustrating as climbing a hill of sand.

Dressing: Dressing is the ability and wear what soothes a person in a manner that will ensure good carriage with very neat appearance. Dressing for drivers is very important because poorly dressed driver may not attract any client or customer to his vehicle. Some transport companies and corporate organizations have established dress code for their drivers. Dress code is strictly to in these organizations. With a corporately dressed driver, the image of such organization is greatly enhanced. A good driver should not wear torn, dirt: clothes as to make him look like' a mechanic wearing his work clothes. He should be clean, neat and smart at all times whether private, commercial, corporate, truck, tanker, lorry or articulated driver.
However there are various categories of drivers thus their dressing and dress code vary. These are:

- Private Drivers
- Commercial Drivers
- Corporate Drivers
- Truck Drivers
- Tanker Drivers
- Lorry Drivers
- Articulated Drivers

v. Image Making and Management: Image making is the ability to create a positive view oneself. It can also be said to be the ability to maintain positively what you do in the way people see you actually doing it.
According to the Free Dictionary by Farlex, Image Maker is a person who uses the techniques of advertising or public relations to create a favourable view as of a person or institution.

Image making is the ability to create integrity by engaging in such activities that attract respect aid honour to oneself and the organization he represents. That is being a good ambassador of your organization. These activities may include;

- being cheerful and friendly to passengers;
- constant assurance to the passengers of their safety e.g. by driving within the acceptable speed limits;
- prompt responses to their requests or problems; etc.

When a positive image is attained it becomes paramount that it is maintained and managed properly to avoid a decline in performance. However, there are various ways of ensuring that the good image so created is maintained. This could be done by periodic conduct of opinion survey of customers perception, use of suggestion boxes, call this number usually written at the back of vehicle to report on the drivers driving pattern.

Human Relations: Merriam Webster dictionary defines human relations as a course. study or program designed to develop better interpersonal and intergroup relationships or adjustments. In this case, driver and his passengers or any other road user, in general terms a ,driver should be of a socially acceptable behaviour.

Quality service delivery: This is the act of carrying out ones services in the most efficient and effective way to meet customer's satisfaction. Nigerians over the years have been known to treat issues of quality service delivery with levity; this has resulted into series of complaints and dissatisfaction from Passengers/clients thereby creating awareness on the need for better quality service delivery. To this end, drivers of all categories of vehicles should imbibe the slogan **"QUALITY SERVICE DELIVERY AT ALL TIMES"**.

CHAPTER 10
EXECUTIVE PROTECTION DRIVING TECHNIQUES

Vehicle Security

- The driver must ensure the security and safety of his passengers and goods, in the car at all times
- When drivers save their boss's life or that of members of his/her family, they save the organizations, themselves as well as their livelihood
- The driver needs to be security conscious always
- Due to increase in crime and other social vices like armed robbery, assassin actions, duping, kidnapping etc, the victims most of the time are both government and private establishment executives who are mostly attacked in transit or sometimes at their residences.

Security Hazard In Driving

Security hazard is anything that endangers or exposes a target to danger, which may affect life, property and information.

- It is a contributing factor to peril and risk
- Anything can be a hazard
- A bottle of caustic acid
- A loaded gun,
- A bunch of oily rags etc.
- Can be categorized into
- Vehicle condition
- Security and safety habits at work
- Travel patterns and crime
- Information abuse.

Vehicle Security/Condition Hazard

- A good driver will make sure that his vehicle is in top performance condition Otherwise; it will disappoint him in an emergency, when it is expected to save lives, property and information.
- For the vehicle to be in top performance condition, the driver must always, as a matter of routine discipline, check the following.
- Electrolyte level in battery.
- Electricity cables are functional and in place.
- Engine oil level and leakages.
- Radiator water/coolant level and leakages.
- Fan belt tension/check.
- Water level in wash and wipe tank.
- Petrol leakage/tyre pressure.
- Marks or cuts in tyres.
- Head lamps, indicator lights, break lights, reverse lights, side mirrors, steering wheel

- Lubricant levels.

General Tyre Condition

- Over inflated tyres can burst when subjected to excessive load due to cornering ride disturbances
- Under inflated tyres can suddenly go flat and make the vehicle difficult to control.
- Excessive tyre wear will reduce steering and braking response
- Treads worn down to the carcass can also burst due to loss of air pressure
- Tyre inflation pressure and tread depth should be checked regularly in accordance with the vehicle manufacturer's recommendations
- Certain combinations of cross ply and radial tyres on different wheels of the vehicle can lead to vehicle instability, and may also be illegal
- Ultra-violet light from the sun or even welding equipment can 'age' tyres and make them more liable to burst

Dangers of Aged Tyres

- Research and tests show that as tyres age, they begin to dry out and become potentially dangerous, even if unused
- Aged tyres may appear to have similar properties to newly manufactured tyres; however once the vehicle is traveling at high speeds (i.e. on a freeway) the tread could peel off, leading to severe loss of control and perhaps a rollover or road traffic crash
- Tyres must be replaced every 3years or after covering 80,000km (whichever comes first) from date of manufacture.
- In a situation where you bought a tyre with date code 2006 , it means the tyre will expire in 2009 whether it has been used or not!

Look When Driving

Petrol gauge
Battery voltage
Oil pressure
Temperature gauge
Lighting system
Speedometer

Security and Safety Habits at Work

Doors

Must be under lock and key anytime you leave the car no matter how short the time may be
Luggage and valuables
Should not be left on display in a vehicle

Take them with you or lock them up in the boot Ignition
Remove the key even when your car is parked in your boss's yard
Put it down when you park otherwise it may be broken by vandals
Watch out for people showing too much interest in your car
They may be thinking about stealing it. If they look suspicious, report to the police
Use pedal lock with a close-shackle padlock

Vehicle papers
Never leave it in your car whenever you leave your vehicle
Keys
Keep your home keys separate from your car keys
Never leave your car keys with mechanics
Never overload a vehicle
Do not form the habit of picking strangers en route
Avoid driving closely to other vehicles
Always be alert for vehicles on your trail
Before each trip, the vehicle should be inspected to see that
Hood latch is secured
Exhaust pipe is not blocked
No one is at the back seat
Fuel tank is at least half-filled
Avoid smoking in and around the vehicle
Keep flammable materials from heat e.g. Carrying of power generating set with fuel in the boot of your vehicle
Remove oil soaked rags left behind in the bonnet
Avoid storing of petroleum products in containers in the vehicle
Have sufficient rest before embarking on a long journey
Avoid collecting parcels on behalf of your boss when he is not around (from unidentified persons)
Do not drive under the influence of alcohol/drugs or in depressed state.

Do on a daily basis, in transit
- Most criminal attacks that have been carried out successfully were done in transit
- The driver is advised to study his boss very well and build a travel pattern that unpredictable, otherwise, all the occupants will become easy target
- Questions drivers must answer and address to prevent travel crime
- Does he go for jogging, play tennis, golf or other recreational activities on a regular basis?
- Where and when does he do all these?
- What are his hobbies?
- Does he decorate himself with visible body ornaments?
- Does he go about in high profile vehicles?

- What is his mode of travels and does he vary his pattern and means of travel?
- Can a pattern be identified?
- How are routes varied?
- Is it possible that anytime he travels, people easily identify him with a particular vehicle number plate or marking?
- Do you regularly inspect your car before driving it?
- Do you always fasten your safety belt while driving?
- What time does your boss normally get home from work each day?
- Do you always dismount the car to open the door for your boss and while doing that, do you keep the engine running?
- Have you identified alternate routes of travel to and from work and other locations that you frequent?
- Are you flippant in speech or engage in "loose" talks?
- Does he habitually stop anywhere on his way home i.e. Supermarket, restaurant club, girlfriend's home etc.
- Does he have a specific day set aside for activities such as shopping, haircut,
- You can answer all these questions by studying your boss closely and by taking necessary precautions against these hazards in transit
- Be alert and vigilant always
- Take note and correct the situation to reduce your vulnerability to crime/criminals.

Information Abuse

- Don't succumb to leading question
  It is meant to extort information
- Guard against flippant talks
- Do not disclose unwarranted information
- Strictly follow the principle of need to know
- With the vehicle key, keep strictly to need to hold
- Help out with the implementation of the need to go
- If anyone tries to blackmail you in order to obtain information about your boss from you, report to management or your boss immediately.
- Protect every information about your boss
- BE VERY CAREFUL ABOUT
- WHAT YOU SAY
- HOW YOU SAY IT
- WHEN YOU SAY IT
- WHOM YOU SAY IT TO
- Beware of unsolicited favours
- It could be a way of buying you over

- Do not give your boss's address or business card to anyone without his consent or authorization
- Do not brag about your relationship with your boss.

Documents to protect in the vehicle

- Blank forms of whatever category
- Letter headed papers
- Personal letters
- Research and policy decisions
- Technical operation procedures

Organization's expectations from drivers

Promotion of organization's image and importance through;

- Effective security
- Awareness Vehicle sanitation and maintenance effort
- Carrying out management instructions on vehicle/occupants security and safety within and outside organization's premises
- Keeping proper record of organization's
- Vehicle spares/papers
- Materials
- Equipment

To reduce loss and help the organization safekeeping of her assets and information

- Practice of good public relations while driving, including the safekeeping of your boss' forgotten property

Checklist for drivers- security awareness

- Be suspicious and if your suspicion arouse, consult your boss and advise to consult with the police
- Be prepared to use the car as a weapon when occasion demands
- Never stop for anyone you do not know, even if you know them, have a second thought as close friends could always be used as a decoy
- Drive on major roads always, if possible
- Check rear of vehicle for luminous stickers or broken rear lights as this is often a ploy used in helping maintain surveillance on you
- When ramming a vehicle on road blocks/ambush always engage a low gear, and **Press accelerator pedal down to the floor**

- Keep your foot down on the pedal as you hit the car and drive straight throu
- Do not ease pressure on the accelerator
- Hit the vehicle near the front or rear tyre, depending on which side has more space for your car
- Do not use high speed as the main method of avoiding a pursuing car

- You may lose control of the vehicle
- Do not allow a pursuing vehicle draw up alongside your car and stay beside
- Drive your car around and get away from the place
- Stay away from corners
- Always remember, when traveling in a vehicle, movement is a primary defensive
- So keep moving!!!
- When inspecting the vehicle, look out for
- Protruding wires
- Finger prints grease
- Spots/scratches on the doors
- Signs of tampering with locks on the doors, boot and bonnet,
- Signs of tampering with the windows
- Wheels and wheel arches conditions
- Never touch the car until you are sure that it is safe
- Special attention should be paid to doors

Make sure that no wires are attached to the inside

- Try to park your car where you can keep an eye on it
- As a rule, you should not leave your car unattended to
- Check underside of your car and inspection mirror
- Go over this checklist as often as possible

CHAPTER 11
EFFECTS OF ALCOHOL AND DRUG ON DRIVING

- Driving involves multiple tasks, the demands of which can change continually
- To drive safely, one must maintain alertness, make decisions based on ever-changing information present in the environment, and execute manoeuvres based on these decisions.
- Therefore, anything that impairs the ability to undertake these multiple tasks affect driving and may result in Road Traffic Crash (RTC).

i. Definitions

Alcohol and Drugs are substances or products used (or intended to be used) to modify (physiological or pathological) status (of a person) for the benefit of the recipient (driver).

Example of alcohol
- Larger beer
- Wine
- Spirit drink (e.g. Calypso, Chelsea, Squadron, etc)

Examples of drug
- Analgesic (Panadol extra)
- Anxiolytic (Lexotan)
- Antihistamine (Piriton)

ii. Alcohol and Driving (Drunk Driving)

- Epidemiological evidence linking alcohol and traffic crash is supported by experimental studies of alcohol effects on specific driving related skills.

- These skills may be divided into cognitive skills, such as information processing, and psychomotor skills (those involving eye, brain-hand coordination)
- Impairment due to alcohol is evident in terms of its concentration in the blood stream.

Effects on Driving

- Affects driving whether one had much of it or not
- Scientific tests show that the substance reduces driver's ability to make quick decisions
- These diminishes
- alertness,
- sight
- hearing

How Alcohol Affects Driving

- Affects one's ability to drive
- Reduces ability to do more than one thing at a time
- Makes it hard to concentrate on driving
- Slows down reaction time if something unexpected happens
- Hinders effective thought coordination
- Makes one experience false confident, which may lead to taking risks
- Upset hearing and vision especially at night
- Makes simple tasks more difficult
- Reduce one's nerves thereby making one more likely to fall asleep while driving
- Makes one experience false confident, which may lead to taking risks
- Affects hearing and vision especially at night
- Makes simple tasks more difficult
- Reduces one's nerves thereby making one more likely to fall asleep while driving.

Various countries of the world have adopted BAC standards as a way of controlling drunk driving

While many countries have legislated maximum permissible BAC levels, threshold at which a country draws its line varies considerably

Values of BAC (%) in various countries

Albania 0.1

Netherlands 0.5

- USA 0.8/1.0
- Italy 0.5
- Romania 0
- South Africa 0.5

- United Kingdom 0.8
- Zimbabwe 0.8
- Moldova 0.3
- Canada 0.8
- Turkey 0.5
- Nigeria 0.08 etc

iv. Concept of Drug abuse

- Every drug has a risk potential
- Apart from overdose reaction, body acceptance of a particular drug varies from one individual to the other
- Chloroquine for instance may induce
  - headache
  - blurred vision
  - itching
- In many cases, the risks associated with drug abuse outweigh perceived benefits In several countries of the world, it is illegal to operate a motor vehicle with any detectable level of a prohibited drug, or its metabolites, in the driver's blood
- Drugged driving" is defined as driving when a drug "renders the driver incapable of driving safely," or "causes the driver to be impaired"
- Principal concern regarding drugged driving is that driving under the influence of drug that acts on the brain could impair one's motor skills, reaction time.
- Drugs act on the brain and can alter perception, cognition, attention, balance, coordination, and other faculties required for safe driving
- The effects of specific drugs of abuse differ depending on their mechanisms of action; amount consumed, the history of the user, and other factors
- Drug abuse is the chronic or habitual use of any drug, chemical or substance to alter the state of the body or mind for other than medically warranted purposes
- Drug abuse usually stems from the aspiration to enhance mental, physical or social performance, often driven by the inordinate desire to excel and to get self-satisfaction
- Some specific excuses for abusing drugs may include to:
  - enhance strength and stamina
  - increase muscle mass
  - remain alert
  - build "confidence"
  - suppress pain
  - relax the body (e.g. muscles, brain etc)
- The compulsion to use drugs to experience the inordinate desired effects, or avoid ort from its absence leads to dependence

- Dependence occurs when a substance abuser cannot do without the substance. This can lead to the following

  - Severe pain
  - Severe depression
  - Violence
  - Mood swings
  - Hallucinations
  - Psychoses (mental disorder)
  - Suicidal tendencies
  - Coma and Death.

Effects of Marijuana

- Mood alteration
- Impairs memory coordination and self-perception
- Triggers lung diseases such as cancer, chest pain, bronchitis If
- Depletes body's immune system response to infections
- Triggers mental problems normally referred to as madness
- Increases heartbeat and blood pressure
- Affects unborn babies resulting to low birth weight and small heads at birth, if born to mothers who smoke Indian hemp
- Destroys the testes in men
- Decreases ovulation and increases menstrual irregularities in women Increases apathy
- Results in loss of ambition and effectiveness
- Diminishes ability to carry out long term plans
- Increases sexual drive
- Predisposes abusers to irresponsible sexual behaviour, thus exposing them to STDs including HIV/AIDS and subsequent DEATH.

Tobacco

- It is contained in cigarettes, cigars, snuff, pipe tobacco and chewed tobacco
- Tobacco contains nicotine, tar and carbon monoxide
- Nicotine can be habit forming, tar can cause cancer while carbon monoxide is a very dangerous gas
- Studies show that cigarette smoking and alcohol drinking lead to use of other dangerous drug
- It can cause:
  - Cough, bronchitis, ulcer
  - Heart attack
  - Stroke
  - Tissue damage
  - Cancer of lungs, stomach, throat, lower parts of the large intestine

Heroin
- User is content to sit and dream in an euphoric state
- Exposure to malnutrition because it suppresses hunger
- Exposure to chronic bronchitis because it suppresses cough reflexes
- Can cause abscess at the site of injection
- Can cause hepatitis, tetanus, endocarditic (infection of the heart lining).

Effects of Heroin
- Can result in permanent necrosis/scarring at injection site
- Can lead to HIV infection because of sharing needles and syringes
- Overdose can lead to death
- For women who use heroin during pregnancy, it can cause heart disease, hepatitis, pneumonia and babies are smaller than average and born addicted
- At times still birth or miscarriages occur.

Cocaine
- Cocaine is a narcotic drug
- Very addictive and can kill
- It is a very strong stimulant to the Central Nervous System [CNS], including the brain.

Special Effects of Cocaine
- Increased heart rate and blood pressure
- Can cause heart attack
- Congestion and running nose can occur
- Disintegration of mucous membrane of the nose and damage to nasal septum
- Restlessness, irritability and anxiety
- Depression when drug is not available
- Weight loss
- Impotence
- Orgasmic failure
- Stomach problems
- Damage to liver, lungs and may lead to death when used for a long time.

Effects of Alcohol on Driving

Alcohol adversely affects your ability to drive as soon as you have your first drink. If you drive while impaired, you are putting your own life and the life of others at risk.

- Increased risk-taking:
  - speeding
  - failure to wear a seat belt

    - recklessness
- False sense of confidence and being in control
- Difficulty maintaining a constant speed and trajectory
- Decreased attention and impaired judgment:
    - altered vision and hearing
    - decreased concentration
    - slower reaction times
    - poor physical coordination
- Drowsiness

Alcohol doesn't affect everyone equally

For the same amount of alcohol consumed and at the same weight, women usually have a slightly higher blood alcohol concentration than men. However, a person's sex has a fairly negligible effect compared to other factors, such as:

- weight
- rate of alcohol absorption
- fatigue
- medication
- age
- state of health

CHAPTER 12
AUTOMOBILE FIRE PREVENTION

There has been frequent occurrences of fire outbreak in recent times this is largely due to rapid development in technology with less avoiding or preventing fire

- It is therefore pertinent in this lecture to stress that an average human being have good knowledge of the elementary principles of Automobile and Do fire prevention
- In an automobile fire outbreak, there is a common erroneous belief that fire is inevitable and in most cases cannot be salvaged
- This is not true as majority of automobile fire outbreak could be avoided controlled but only if certain simple precautions are observed, so that the loss associated with fire disaster could be reduced

i. Definition of fire

- Starts when a flammable and/or a combustible material with an adequate of oxygen or another oxidizer is subjected to enough heat and is able to sustain chemical reaction.

OXYGEN + HEAT + FUEL = FIRE

Fire is the effective combination of 3 basic substances; oxygen in the air, heat, fuel as in any combustible material, resulting in the production of heat or light.

ii. Classes of Fire

- There are four classes of fire

A- Ordinary combustible material e.g. wood, clothing material
B- Flammable liquid and gases e.g. petrol, cooking gas
C- Electrical materials e.g. electrical cables/wires from sparks

D- Metals e.g. sodium, titanium, magnesium.

iii. Common causes of fire

Most common cause which is due to the imperfection in man include the following:

- Smoking and throwing cigarette ends carelessly
- Storing fuel in vehicles and houses
- Leaking vehicle tanks and fuel hoses
- Defective electrical wiring in vehicles
- Spontaneous ignition
- Sparks from loose ends of throttle, hand brake cables and motorcycle stands
- Lack of proper vehicle maintenance
- Accident
- Fire that results even when all precautions are put in place e.g. vehicle crash, explosion, electrical sparks.

What Are the Most Common Causes of Car Fires?

Having a broad understanding of the factors that can lead to your vehicle catching on fire can help you prevent it from happening.

Here are some common causes of cars catching fire. Keep in mind that none are mutually exclusive, meaning more than one factor can contribute to a fire.

Poor Maintenance

The most frequent human cause of a car catching fire is poor vehicle maintenance. Car owners who don't maintain their vehicles risk mechanical failure that can contribute to a car fire.

The USFA reports that mechanical failure is the leading cause contributing to the ignition of a vehicle fire about 45 percent of the time.

Vehicle owners who perform regular preventative maintenance on their vehicle can avoid faulty hoses, leaky seals, excessive engine temperature, and worn out electrical wiring that can ultimately lead to a dangerous fire by allowing flammable fluids to leak onto hot exhaust manifolds.

Impact of Car Crash

Auto manufacturers take great care to design vehicles that can withstand a crash without starting a fire or triggering an explosion. Yet, depending on the point of impact of a car accident, fires and explosions still routinely occur.

A traffic accident that occurs at high speeds can create enough force to cause leaks, fluid spills, heat, and smoke. High heat and spillage create the conditions for a fire.

Motor vehicle fires that occur because of car accidents are often the most deadly; the USFA estimates 60 percent of fatal highway automotive fires occur because of a traffic collision.

Electrical Problems

Electrical systems can cause a wide range of problems in a vehicle, one of the most dangerous of which is a fire in a vehicle. The charging cycle in a car battery causes highly flammable and explosive hydrogen to build up around the engine.

If wires are loose or worn, they can throw a spark and ignite that hydrogen. Other wires that run through the vehicle for doors, seats, and radios can also

throw a spark and start a fire. If batteries are not properly secured inside the engine compartment or elsewhere, it can also present a fire hazard.

The USFA estimates that almost 30 percent of the time the insulation around electrical wires in a car were the first to ignite in a highway vehicle fire.

Leaking Fluids

Passenger vehicle systems contain chemical fluids that are hazardous to humans, many of which are highly flammable. Fuel, oil, transmission fluid, brake fluid, radiator coolant, and power steering fluid circulate throughout their respective systems when a vehicle is running.

If hoses break or leak, these fluid leaks. On their own, should not usually ignite. However, in the event of a spark from an electrical failure or in an accident, they can ignite.

Most fluid-related fires are referred to as engine fires as they typically start in the engine compartment, where the vast majority of these hazardous liquids are located. Brake fluid and gasoline or diesel, however, run the length of the vehicle, posing a risk of fire throughout the vehicle when something else goes wrong.

Leaky Fuel System

Usually cited as the most common cause for cars to start fire, leaks in the fuel system are dangerous. A car accident or poor maintenance can lead to a fuel leak, but a leak can also emerge spontaneously as a car ages.

Gasoline is the most dangerous fluid in a vehicle. At temperatures above 45 degrees Fahrenheit, just one little spark can cause a fire. Spontaneous combustion, in which gas ignites on its own without a spark, occurs at 495 degrees Fahrenheit.

If you ever smell gasoline in or around your vehicle, immediately try to find the source and stop the leak (either on your own or with the help of a mechanic) to prevent a catastrophic fire or explosion.

Overheated Engines

A car engine can overheat for a wide array of reasons, but most causes come back to the cooling system.

A coolant leak, bad radiator fan, faulty water pump, or clogged hose can prevent heat from escaping the engine compartment. When engine temperatures rise, the dangerous fluids in the engine compartment can begin to leak, coming into contact with extremely hot surfaces in the engine and igniting.

Drivers can avoid engine overheating with regular maintenance, but some overheating can occur as a result of a design flaw.

Design Flaws

In designing a new car, vehicle manufacturers sometimes make poor choices that inadvertently increase the risk of a car catching fire. In many cases, manufacturers find and correct these problems through a recall, but often that only happens after multiple vehicles have caught fire because of the design flaw.

Preventing Automotive Fires

The NFPA provides the following advice to prevent automotive fires:

- Perform regular maintenance on your vehicle or take it to a professional mechanic. If you notice any leakage or your car seems to be running improperly, have it checked out.
- If you need to transport gasoline, only use a certified, sealed gas can and only transport a small amount. Always keep a window open for ventilation when you transport gas.

- Never transport gas cans or propane tanks in the passenger area of a vehicle. They should always go in the trunk or the back of a pickup, if you have a truck.
- Never park a vehicle where flammable items can touch the catalytic converter or exhaust system, and start a fire. A catalytic converter can reach temperatures of 600 degrees under normal conditions
- Always put safety first behind the wheel to avoid an accident that could lead to an automotive fire.

What to Do if Your Vehicle Catches Fire

Drivers often fail to recognize the rising danger of being in a burning car, especially after a car accident. As soon as you suspect one might occur or see evidence that one has started, however, take the following safety measures recommended by the USFA:

- Pull your vehicle over immediately, so you can make a quick exit. Aim to get as far away from traffic as possible.
- Turn off the engine to help stop any fluid movement that can feed the fire and lead to an explosion.
- Get all passengers out of the car and move as far away as possible. The National Fire Protection Association (NFPA) recommends moving at least 100 feet away from a burning vehicle.
- Once you reach a safe distance, call 911 to report the fire and to send for emergency first responders.
- Do not attempt, for any reason, to go back to the burning car to get any personal belongings. An explosion can send debris flying over long distances. Bumpers, hatchbacks, tire rims, wheels, axles, engine parts, the exhaust system and more can become shrapnel that cause serious injury, sometimes death, to anyone too close to the vehicle.

- Never open your hood or trunk if you suspect a fire. This rapid change gives the fire oxygen, which is fuel for the fire that can cause it to grow out of control.

iv. Fire Extinction Method

- Smothering
- Elimination of oxygen from the burning material, thus making combustion impossible as there is no more oxygen
- Is achieved by the use of foam vaporizing liquid carbon-dioxide and dry chemical powder.

- Starvation
- Elimination of fuel or the combustible materials from the vicinity of the fire thus making combustion impossible.

- Cooling
- Applying water or chemical extinguisher.

v. Classes of Chemical Fire Extinguishers

- Class 'A'
  - Expels or generates foam, either using compressed gas or cartridge chemically or mechanically
- Chemical foam extinguishers are called turn-over
- Mechanical foam extinguishers are called "Air foam type".
- Class 'C'.

- Expert vapour forming liquids or gases e.g. carbon-dioxide, B.C.F etc.
- Class 'D'
- Expert dry chemical powder
- Achieved by using stored gas pressure or gas cartridge

Table 4:

CATEGORY OF VEHICLE	No OF EXTINGUISHER	CAPACITY OF EXTINGUISHER
Taxi car & Private cars	1	1kg
Pick-up Vans	1	2kg
Buses	1	2kg
Luxury Bus	2	6kg
Lorries	2	6kg
Articulated Vehicles/Trailers	2	9kg

Fire extinguisher for different categories of vehicles

vi. Use fire extinguisher

P - Pull out the safety pin
A - Aim nozzle at base of fire
S - Squeeze the trigger on top of extinguisher
S - Sweep fire with extinguishing medium at about 6ft.

Simple fire precautions

- Always ensure that the exit routes in your vehicles are functioning
- All doors must be easy to open from both inside and the outside
- Make sure your bonnet can open and lock easily
- Always check your fire extinguishers every morning as you check your engine oil and water level.

To ensure you are not carrying an expired fire extinguisher

- Always keep your extinguishers in a cool dry place, away from external manipulation and a place that can be easily reached by the driver
- Ensure that the safety pin extinguisher is removed before use

- Always point the nozzles of the extinguisher on the base of the fire whenever fighting fire
- Ensure your ignition is off before fighting automobile fire
- Be alert and observant at anytime, anywhere, any day while driving.

CHAPTER 13
SAFETY GUIDELINES ON SPECIAL DRIVING CONDITION

- Nigeria has a wide range of weather condition that can impinge on normal driving situations and techniques
- Different weather and road conditions can lead to variety of different hazards from season to season and from region to region
- Problems vary widely with the type of road and the amount of prevailing traffics.
- This lesson deals with the main problems of driving under difficult and techniques of coping in the conditions and techniques of coping in the conditions.

i. Special Driving Conditions

- Night driving
- Driving in the rain or foggy weather
- Driving in a Convoy
- Driving through a roundabout riving in work zone/construction area
- Driving at intersections and turns
- Priority/Right-of-way
- Driving at "U" turns.

Night Driving

- Is a delicate mission that requires considerable caution to make up for reduced visibility
- It's a fact that about 90% of driving decisions are based on what is seen
- ability to see well at night generally declines even with age Driving safely at night is more demanding than day time

- Is more dangerous because the distance one can see ahead or to the side is reduced
- The headlight covers about 100m ahead
- You are to drive at a speed that allows you to stop safely within that dis

- This is called "driving, within the range" of your lights
- The significant difference between night and day is in the level of general illumination visibility
- It is therefore logical to conclude that the key factor discussed in this section be summarized in 2 statements
- See and be seen
- Show consideration towards other road users

- Be particularly careful and watch out for other road users (especially motorcyclists and pedal cyclists)

- Avoid moving along on the road without taillights
- Reasons:
  - several vehicles travel without taillights
  - bicycles are without reflectors or riders without reflective clothing
- Always slow down and dip your lights when approaching an on-coming traffic
- Unfortunately, several drivers do not do this

Safety tips on Night driving

- Use headlights
- From 1 ½ hour after sunset to 1 ½ hour before sunrise
- When visibility is less than 300metres
- Whenever you are using your windshield wipers to clear rain
- In fog
- If an approaching driver flashes headlights at you during a period of low visibility probably means your vehicle was hard to see
- Head lights must be on low beam when you are within 150metres of an approaching vehicle
- 60metres of a vehicle ahead of you even if the vehicle ahead is in the opposite lane
- Flash your headlights to high beam for a second, then back to low beam if approaching who does not dip his light
- Do not keep your light on high beam even if others refuse to dip theirs
- Remember to dip your lights for pedestrian approaching you
- To avoid the glare of approaching high beams, shift your eyes to the right.
  - use the road edge as a guide until the approaching vehicle passes by
- To reduce glare from the lights of vehicles behind you
  - switch your interior rear view mirror to the correct position
- Light from inside your vehicle or from street lights makes it hard for you ahead
- Keep the interior light off and dim the dash board lights
- Adjust your sun visor to reduce glare from overhead lights
- Broken or dirty windshield, dirty headlights or windows will definitely in from approaching headlights

- Ensure your lights and glasses are clean
- Windows do not mist up on the inside.

ii. Driving in the Rain or Foggy weather

- A thin coating of rain or snow makes roads slippery
- Wet leaves can be especially slippery and hazardous
- Avoid high speed when it rains.

Hydroplaning

- Occurs when vehicle tyres begin to actually ride on the water lying on top of the road pavement
- Can cause complete loss of tracking of steering control
- Occurs at higher speeds
- Occurs if the vehicle's tyres are improperly inflated or treads worn.

Precautions to driving when raining

- Drive slowly when there is heavy rain
- Good tyres with deep tread help prevent hydroplaning
- Turn on your headlights during rain or fog in order to be visible to other motorists
- Replace windshield wipers blades if they cause streaks or smears on the wind screen
- Keep headlight in low beam
- Remember it is even more risky to drive when there is oil on the road, slow down else the vehicle will skid easily.

iii. Driving in a Convoy

- Hold a drivers meeting before departing and give each driver a printout of the route turn by turn with odometer reading,
- Odometer is an instrument that displays the distance travelled by a vehicle (it measures in miles or kilometer)
- Review the road rules
- Assign someone with a radio to be the sweeper

- The sweeper is the last car that lets the group leader know when everyone has made a light or a turn onto a new road
- Determine a radio frequency to set the GMRS/FRS family radios
- Lights on and set odometers to zero
- Do a radio check
- If your convoy is larger than 10, it is best to break it down into separate convoys with a different leader and sweeper
- Separate the convoys by approximately five to ten minutes so as to avoid confusion on the radios
-

- You may wish to use different channel frequencies
- Signal all turns early and relentlessly
- Favour the right (slow) lane when on 4-lane highway
- Allow suitable clear distance between you and the car in front of you
- Always try to keep the car in front of you in sight
- Watch the car behind you.

- If he slows down, you slow down
- As the leader sees the car behind him slowing down, it is his cue to slow down also
- If a non-convoy driver needs or wants to cut in, let him!
- There will be plenty of time to regroup on stretches of four lane road or at rest stops
- If the convoy gets separated, the group leader will proceed until he can find a safe place to pull over and let the rest of the convoy catch up.
- If your section of the convoy gets separated, do not foolishly speed to catch up
- If the leader or any other driver sees that the convoy must stop then if possible grab the two way radio and simply say "braking" or "stopping" to let everyone know
- This can really help the drivers behind and improve overall reaction time

- Use your best judgment when approaching a long green or yellow traffic signs
- Don't be concerned about delaying those behind you by conservatively judging the light
- Passing if you need to pass a slow car or cars, it should be done "one car at a time
- In other words, don't all move out at the same time and pass at once
- Pass as an individual, not as a group
- Passing: when completing a pass, if there's not room to re-merge into the right lane, move to the front of the convoy
- The route is well marked, and there will be plenty of opportunity for the lead came to move back into position
- Rain: in event of rain, some drivers will choose to "run through it", while others will want to stop and put their hoods up
- This is one of the most dangerous instances you will encounter, especially if visibility is poor
- If you choose to pull over, signal long in advance of your pull onto the shoulder and try not to stop abruptly in case the person behind you has the same idea
- If the group leader misses a turn, do not "knee jerk"
- Announce the error on the radio and proceed cautiously to a place where the convoy can safely turn around
- Use common sense
- Drive as though you are an individual following a planned route and map, rather than a participant of a group
- Main objective is first and foremost a safe and pleasant drive; travelling/arriving together, while nice, is secondary
    - Convoy Checklist
- Remember to go along with:
    - GMRSFRS "Thlk about" Radios (set to your channel & security code
    - Plenty of fresh batteries
    - Cell phone (not to be used while driving)
    - Map or Atlas
- Don't forget to:
    - Check tyre inflation, Engine oil and Fluid levels
    - Top Fuel Tank
    - Go easy on coffee/liquids prior to departure

iv. Driving Through A Roundabout

The Roundabout

- Is a circular intersection with a relatively small diameter that compels drivers to slow down,usually to about 25km/hr or less
- Are designed to reduce the number and severity of crashes at an intersection compared to intersections controlled by traffic signs/sign,

- Are designed to distribute traffic to various directions with lesser

Precautions on Driving Through A Roundabout

- Look for the street and direction suns you need as you approach the roundabout to know which exit to take
- Signs are posted along the roadside before you reach the roundabout
- Always yield the right-of-way to traffic (any vehicle or motorcycle or pedestrian) on your left side as you are entering the roundabout. Such traffic has the right of way
- Take absolute caution while negotiating a roundabout else the vehicle may summersault.

v. Driving safely in Work zone/Construction area

- Road work zones are dangerous to drive and work in
- Slow down or stop when approaching a work zone to read all signs and proceed as may be directed
- Traffic lanes may be diverted, shifted or completely closed, so watch out!
- Warning signs are often posted in advance of road construction projects and other - areas that can affect free traffic flow.

Intersection and Turns

- Driving skills and knowledge are exhibited at intersections and turns to avert dangers.
- Most traffic crashes occur at intersections.
- To avoid such crashes, a driver must understand the right-of-way rule and how to make roper turns

Priority/Right-of-way

- Is a concept whereby one road user has the right of use of a section of road exclusion of another road user with a competing claim

- When followed properly, resolves conflicts on who must wait in difference other
- Traffic signs, signals, and pavement marking do not always resolve conflicts.
- Right -of-way rules, with examples on how they apply on the road
- A driver approaching the intersection must yield the right-of-way to traffic already lawfully using the intersection
- A vehicle entering a railway from a driveway, alley, private road or any place that is not a roadway, must stop and yield the right-of-way to traffic on roadway, and to pedestrians
- If drivers approaching from opposite directions reach an intersection at a the same time, a driver turning left must yield to approaching traffic going or turning right
- At intersections not controlled by signs or signals or where two or more to stop at STOP signs at the same time and they are at right angles to one and the driver on the left must yield the right-of-way to the driver on the right especially if he is on the major road.

U-Turn

- Is a turn executed to proceed in the opposite direction
- Please do not make U-turn
- In a highway
- For the crest of a hill or a curve
- Round and any place where other drivers cannot see your vehicle from-150m away to either directions

- In business districts.

Emergency Driving

- The occurrence of an emergency while in motion could cause a crash if the driver is not in absolute control of the vehicle
- A defensive driver should expect an emergency to occur any time he is behind the steering
- This will enable him to adequately prepare and avoid road crashes.

At is an Emergency?

- It is an unexpected occurrence that can result into an unpleasant situation_ like loss of life and property, if not properly controlled
- An immediate and appropriate action is expected during emergency to bring about normalcy.

Response to Emergency

- Emergency response is made by the driver immediately he discovers a sudden occurrence that could cause problems
- Emergency preparedness by drivers is the prevention/immediate action required to prevent and reduce the effect of an emergency on lives and property.

Natural/Environmental causes

- Celled trees
- Ganattan haze
- Hooding
- Exploded rock/falling rock
- Rain storm/wind
- Blind hills and back spots, etc.

Can-made causes

- Broken-down vehicles
- Bomb threat
- Road crash
- Armed robbery
- Fire incident
- Political/social I disorder
- Items on the road like leaves, woods, etc
- Inadequate construction warning sign
- Bush burning
- Pedestrian/animal crossing
- Inattention: Behind every ball, there is a boy.

How to manage Emergency

- Be alert always
- Be prepared to avoid problems Maintain vehicle always
- Be bold and confident
- Do not panic
- Be vigilant
- Identify and be on the look-out for escape route(s)
- Use your vehicle as a weapon if need be i.e. ramming to get away
- Use technical surveillance devices and skill Apply good sense of judgment

- Remember, failure to plan is planning to fail Prepare for emergency so that can escape death
- Fuel vehicle well, at least half filled tank always
- Control speed as it will definitely reduce high risk of being involved in road during an emergency.