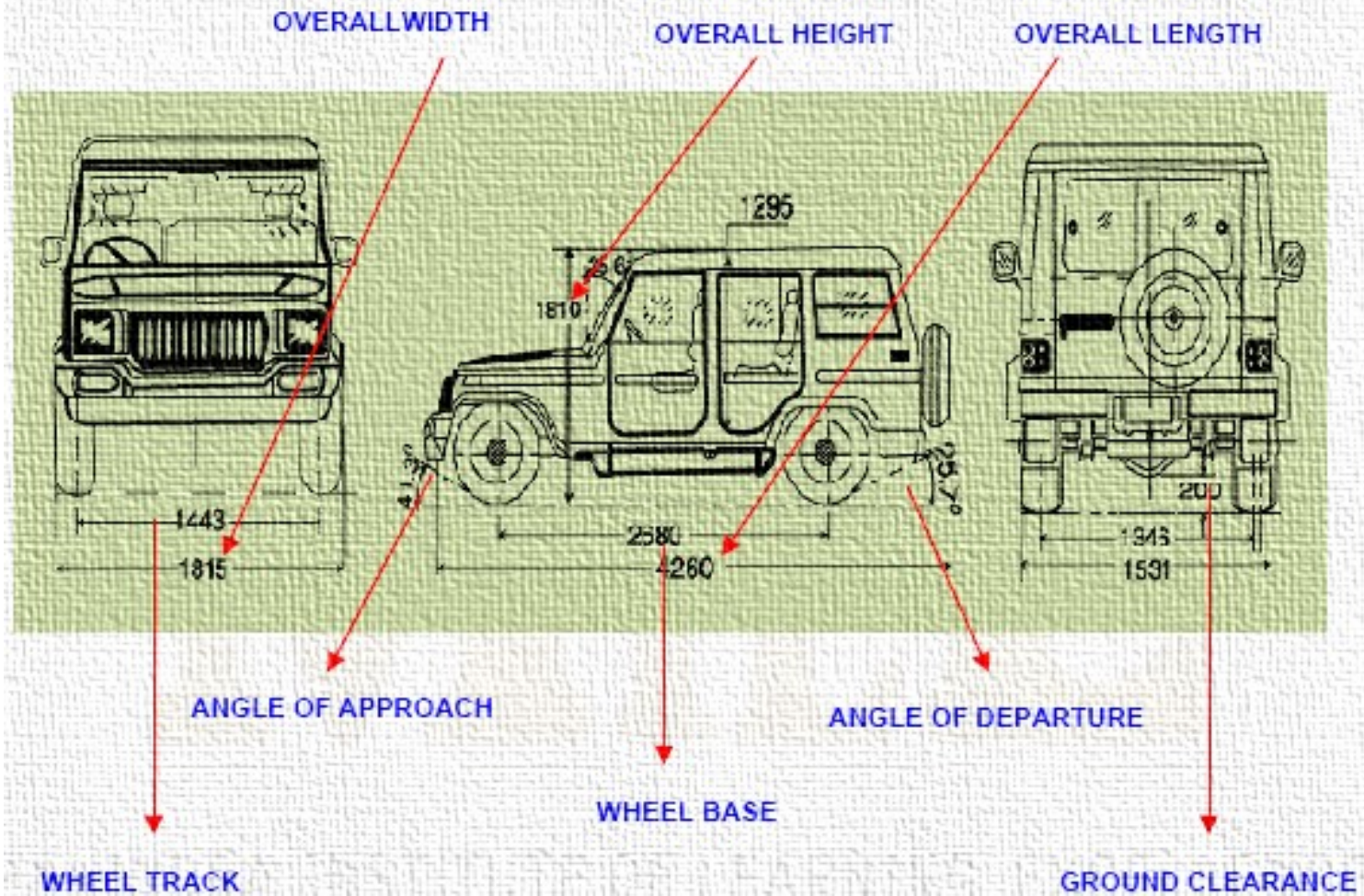


# Introduction to an Automobile



# VEHICLE DIMENSIONS



## VEHICLE WEIGHTS

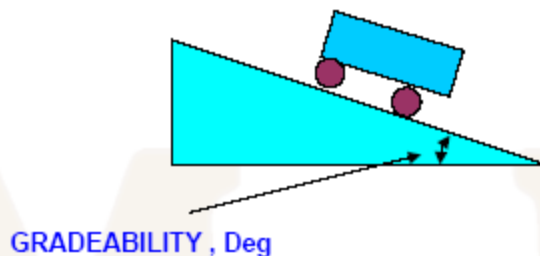
**KERB WEIGHT** - The unladen weight of the vehicle - No passengers

**GVW (Gross Vehicle Weight)** - The fully laden weight of the vehicle with passengers/goods.

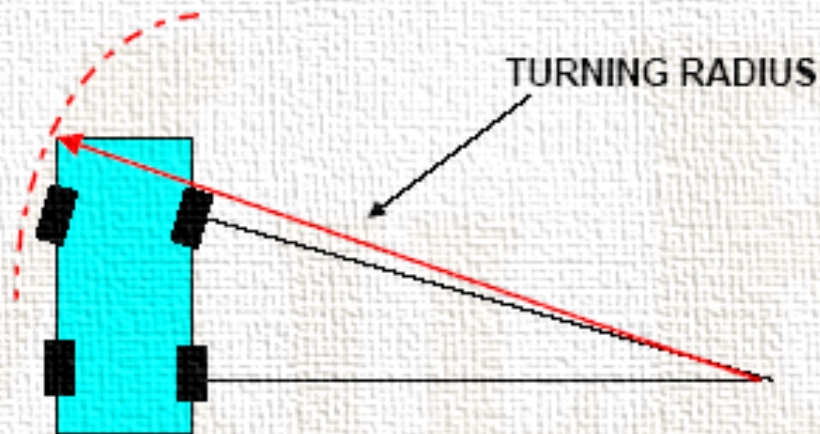
**PAYLOAD** - The difference between GVW and Kerb weight

## VEHICLE PARAMETERS

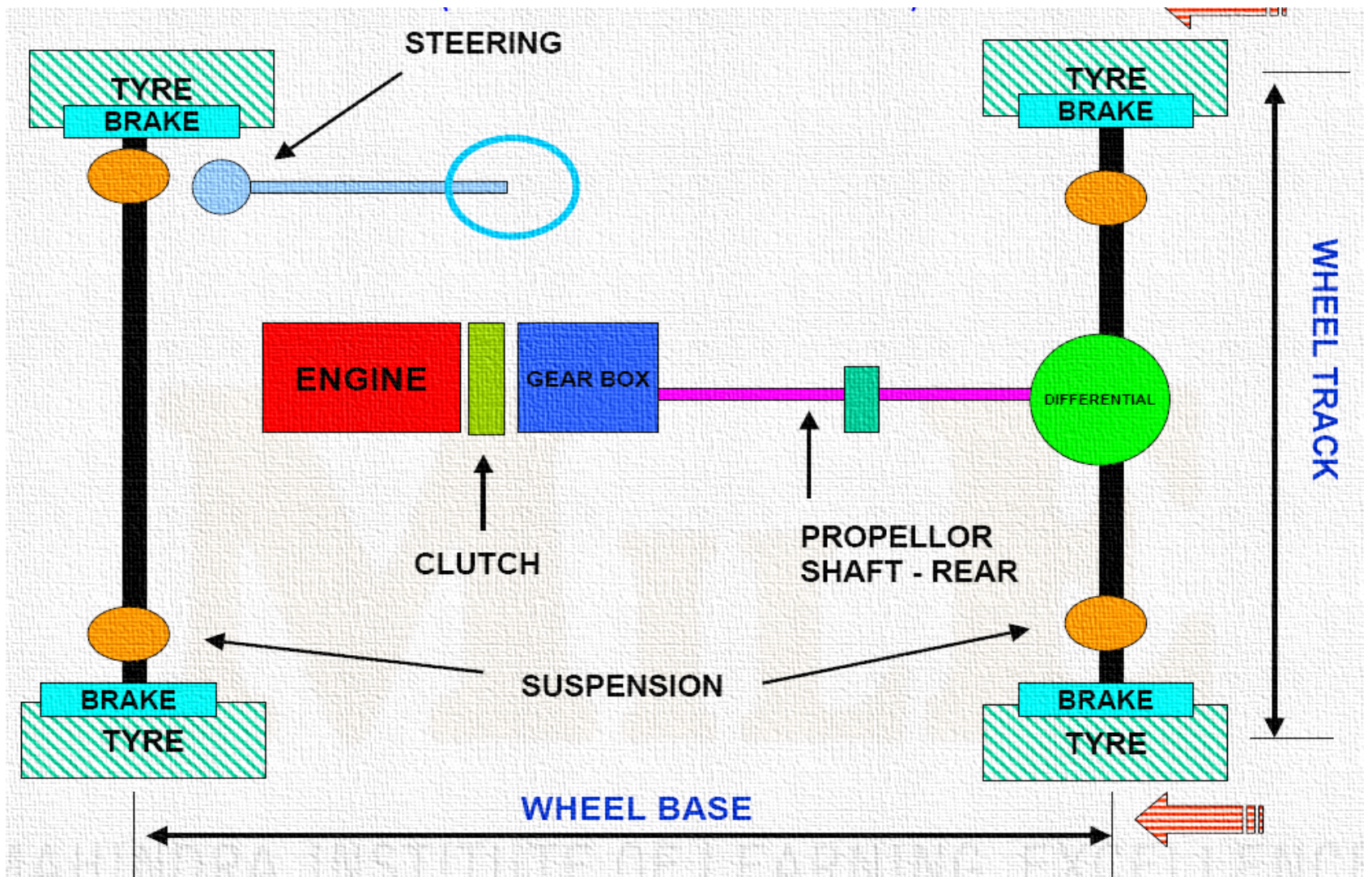
**GRADEABILITY** - The maximum gradient a vehicle can climb, under GVW conditions, in first gear.



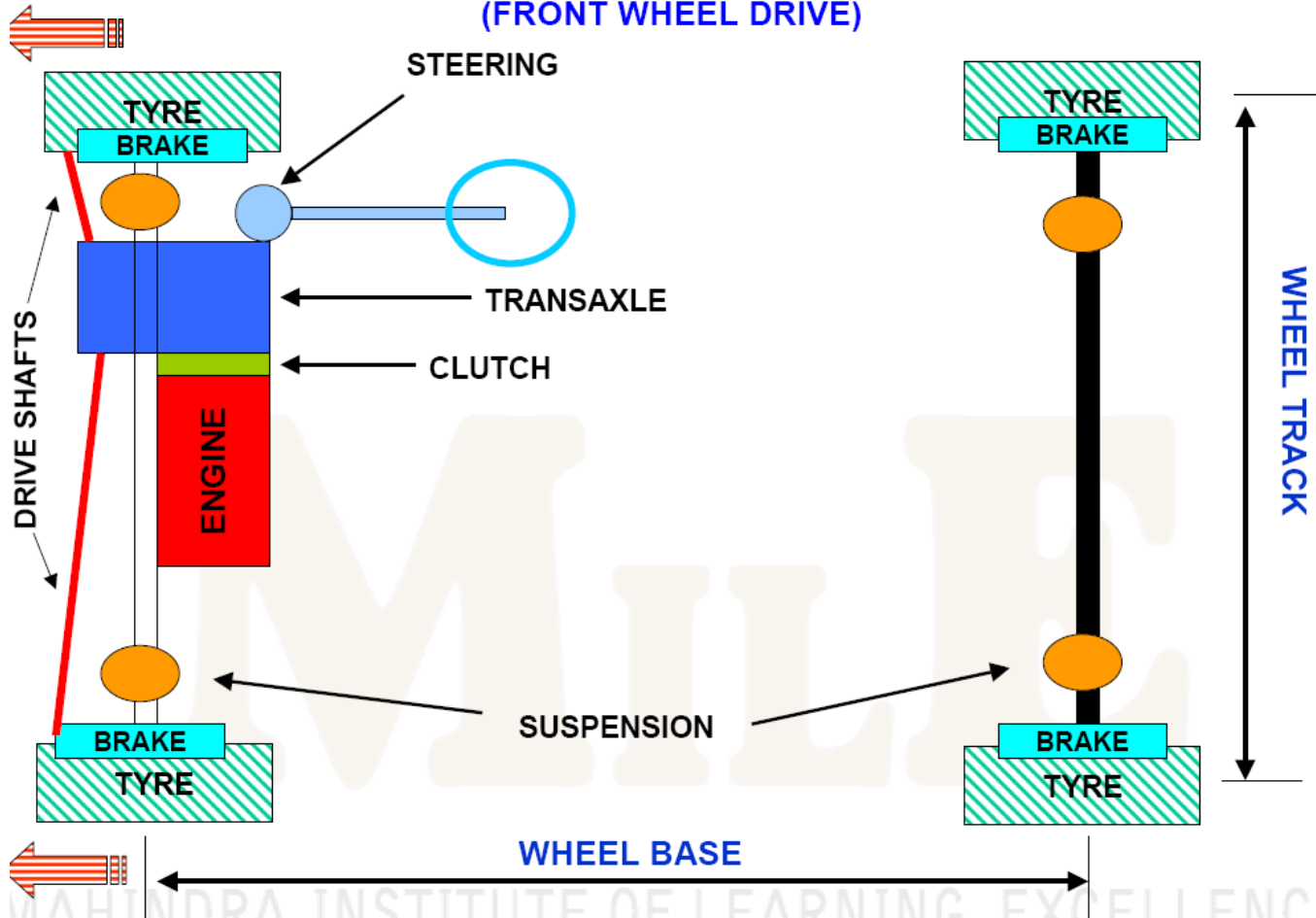
**MINIMUM TURNING RADIUS** - The radius of the circle made by the outermost point in the vehicle, while taking a turn with maximum wheel turning







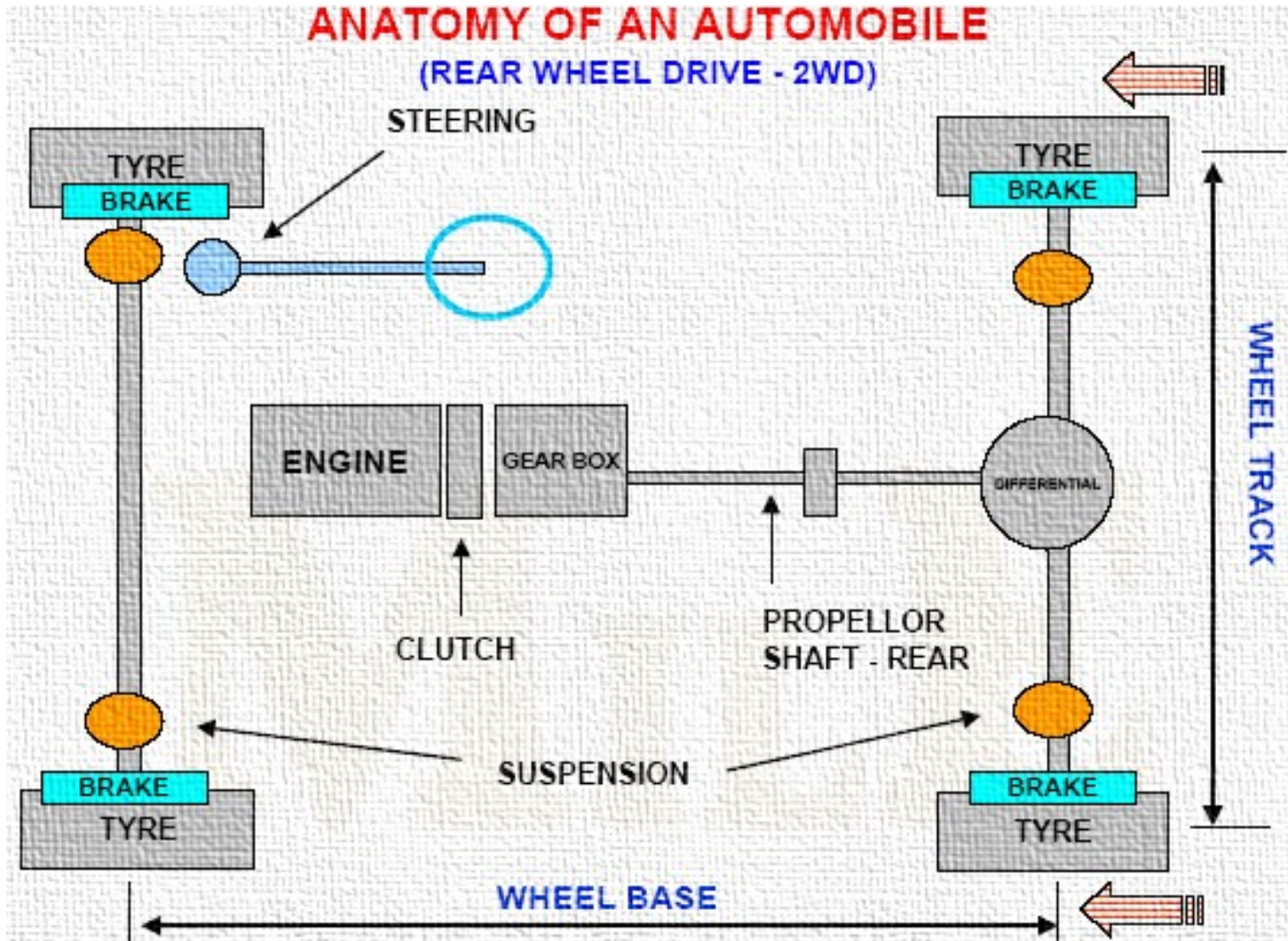
# ANATOMY OF AN AUTOMOBILE (FRONT WHEEL DRIVE)



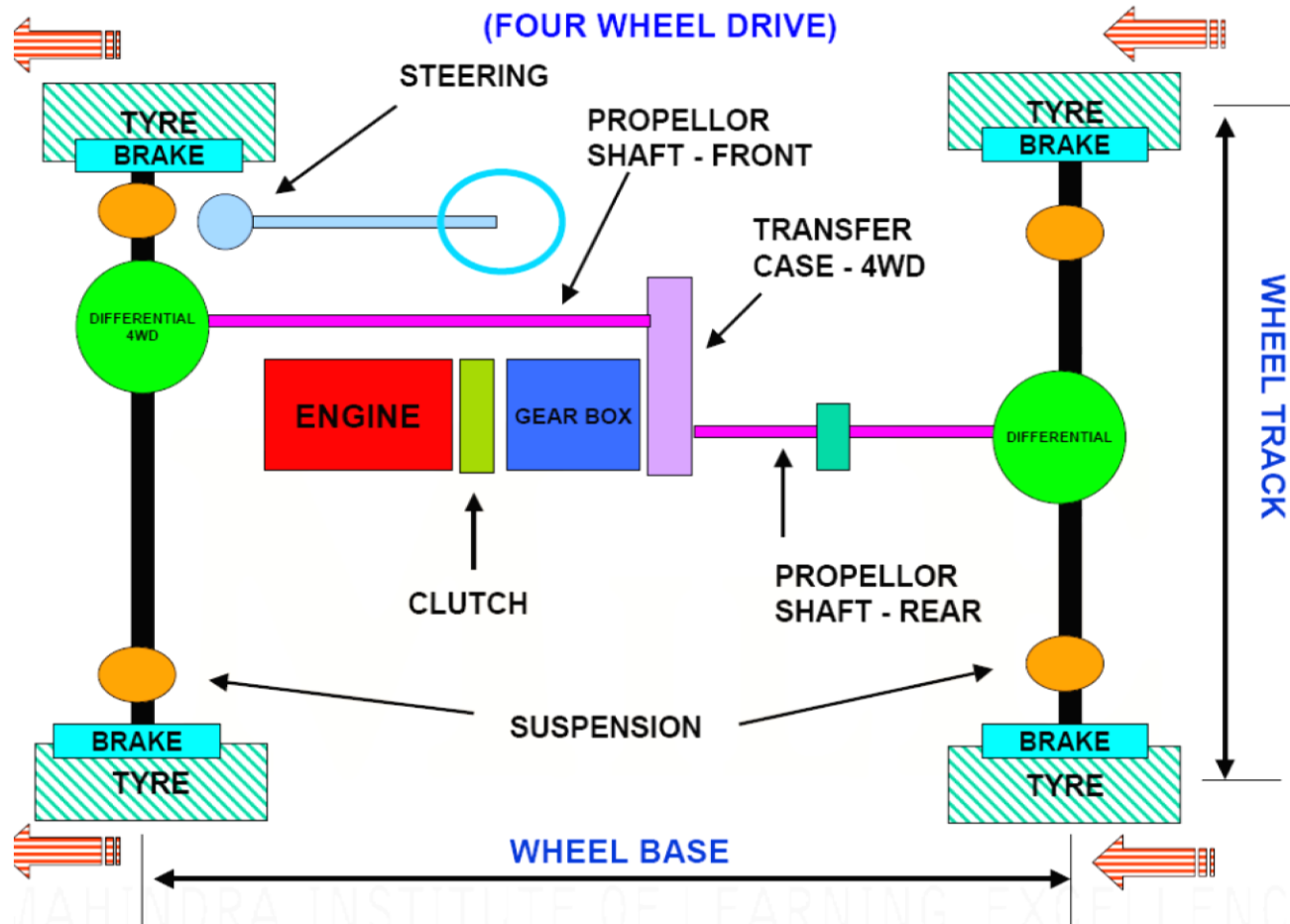


# ANATOMY OF AN AUTOMOBILE

(REAR WHEEL DRIVE - 2WD)



# ANATOMY OF AN AUTOMOBILE (FOUR WHEEL DRIVE)

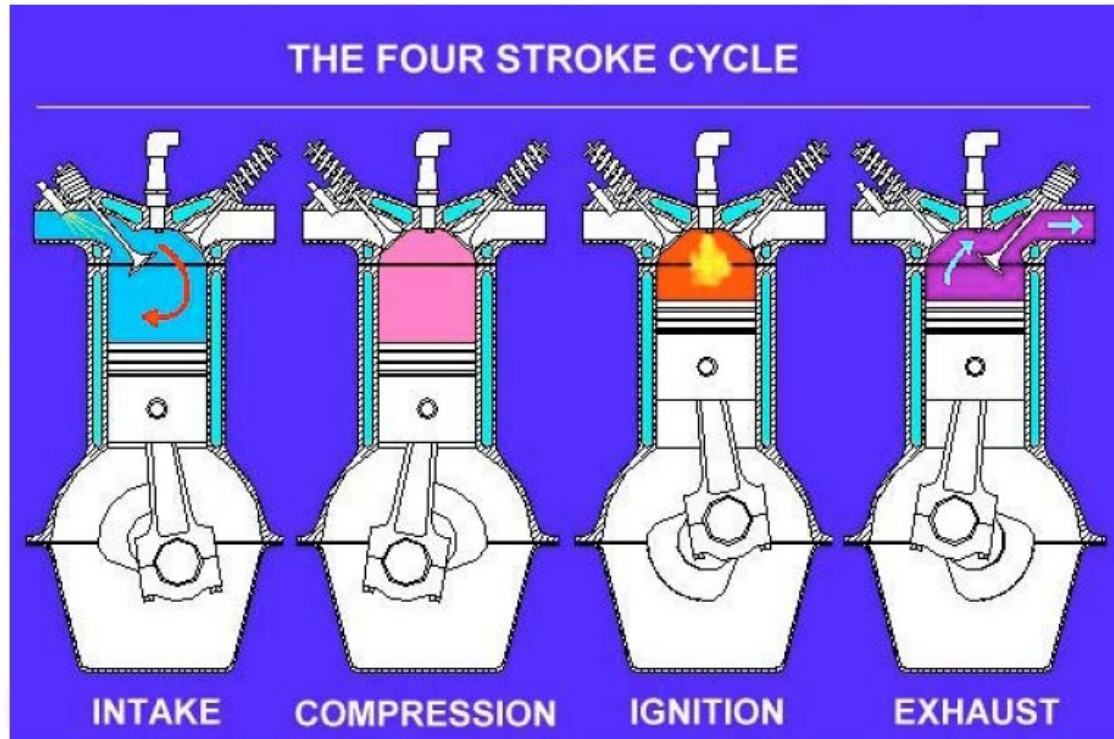


MAHINDRA INSTITUTE OF LEARNING EXPERIENCE





# ENGINE OPERATION - 4 STROKE



# DIESEL ENGINE

DIESEL ENGINES ARE COMPRESSION IGNITION ENGINES & USE DIESEL FUEL

DIESEL ENGINES ARE BROADLY CLASSIFIED AS **DIRECT INJECTION (DI)** AND **INDIRECT INJECTION (IDI)**

## DIRECT INJECTION ENGINE (DI)

ON DIRECT INJECTION DIESEL ENGINES, FUEL IS SPRAYED DIRECTLY ON TOP OF THE PISTON.

- Highly fuel efficient
- Noisy
- Easy cold starting ability

## INDIRECT INJECTION ENGINE

ON INDIRECT INJECTION DIESEL ENGINES, FUEL IS SPRAYED ON TO A SEPERATE PRE-CHAMBER.

- Less fuel efficient
- Less Noisy/smooth
- Requires pre-heating for starting



# PETROL/CNG/LPG ENGINES

PETROL ENGINES ARE SPARK IGNITION ENGINES & USE GASOLINE/CNG/LPG FUEL

PETROL ENGINES ARE BROADLY CLASSIFIED AS **CARBURATED** AND **FUEL INJECTED ENGINE**

## CARBURETED ENGINE

ON CARBURETED ENGINE , THE PETROL & AIR ARE MIXED IN THE CARBURETER BEFORE BEING SENT IN TO THE ENGINE

## FUEL INJECTED ENGINE

ON FUEL INJECTED ENGINES, THE PETROL IS INJECTED SEPERATELY AND THE PETROL AND AIR ARE MIXED INSIDE THE CYLINDER.

FUEL INJECTED ENGINES CAN BE FURTHER CLASSIFIED AS :

**SINGLE/MULTI POINT FUEL INJECTION**, Where the fuel is injected outside the cylinder

**GASOLINE DIRECT INJECTION (GDI)** , Where the fuel is injected directly in to the engine cylinder





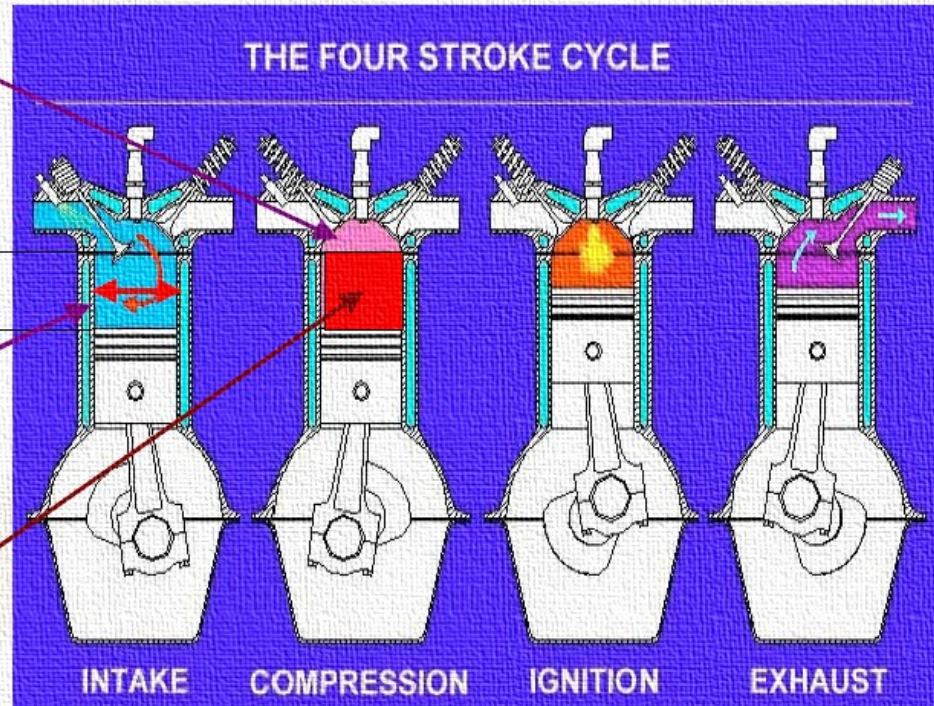
# ENGINE PARAMETERS

CLEARANCE VOLUME

STROKE, mm

BORE, mm

CYLINDER CAPACITY, cc



ENGINE CAPACITY, cc = CYL. CAPACITY X No OF CYL

UNITS - cc - Cubic centimeter

- Lit - Liters = cc/1000



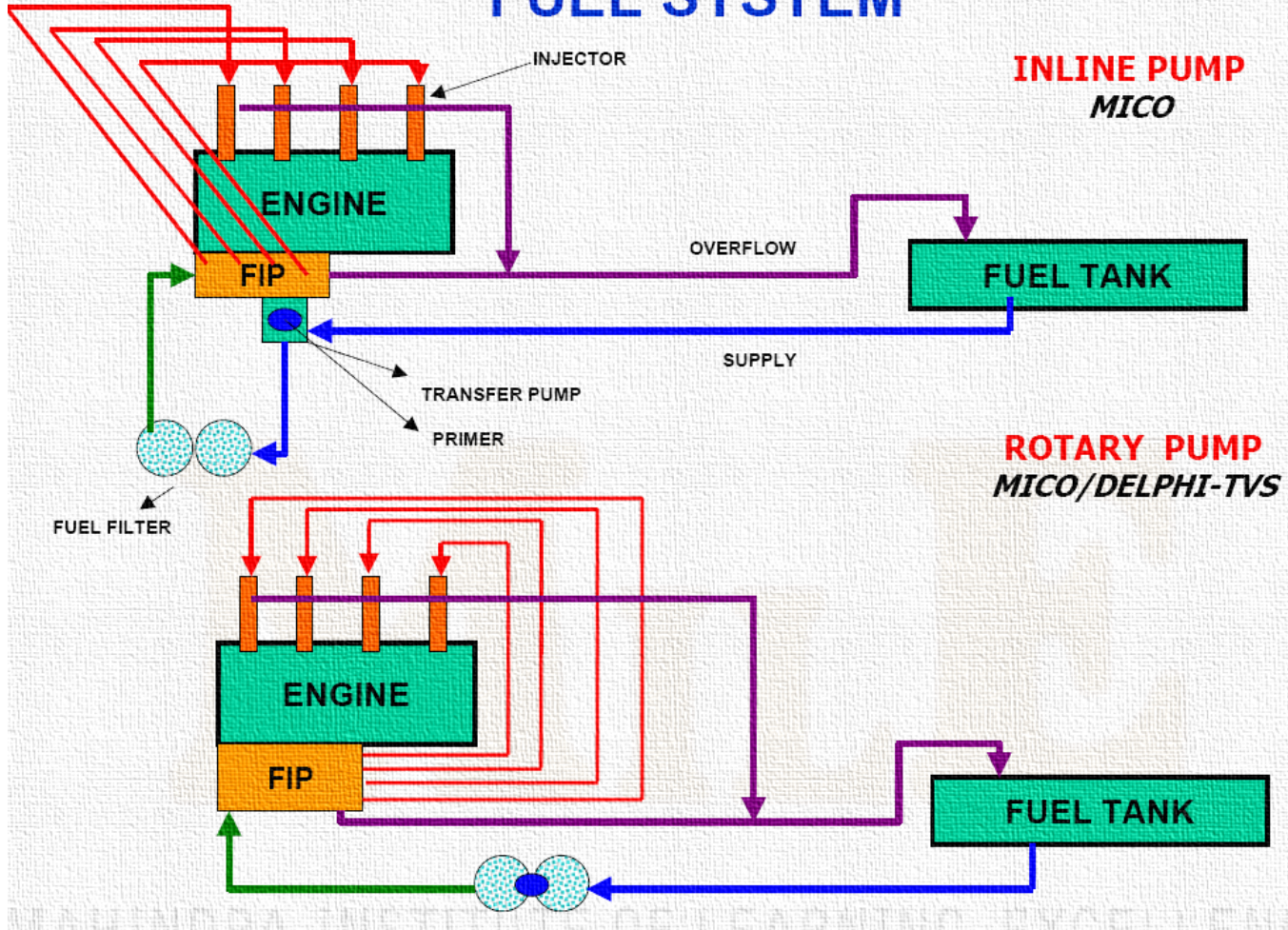


# FUEL SYSTEM

- FUEL SYSTEM IS THE HEART OF THE ENGINE
- IT TRANSPORTS FUEL FROM THE FUEL TANK AND INJECTS IT UNDER HIGH PRESSURE IN TO THE ENGINE
- FUEL INJECTION SYSTEM IS A HIGH PRECISION, HIGH TECHNOLOGY PRODUCT
- FUEL INJECTION PUMPS ARE OF 2 TYPES - **INLINE PUMP & ROTARY PUMP**
- IN INDIA, **MICO & DELPHI-TVS** MANUFACTURES FUEL INJECTION SYSTEM
- COMPONENTS OF FUEL SYSTEM ARE :
  - FUEL INJECTION PUMP(FIP)
  - FUEL TRANSFER PUMP
  - FUEL INJECTORS
  - FUEL FILTERS
  - FUEL LINES



# FUEL SYSTEM





# FUEL SYSTEM COMPONENTS

**1. FUEL INJECTION PUMP** - Fuel injection pump sucks fuel from the tank , pressurises the fuel to approx. 600 - 1000 bar and sends it to the injectors.

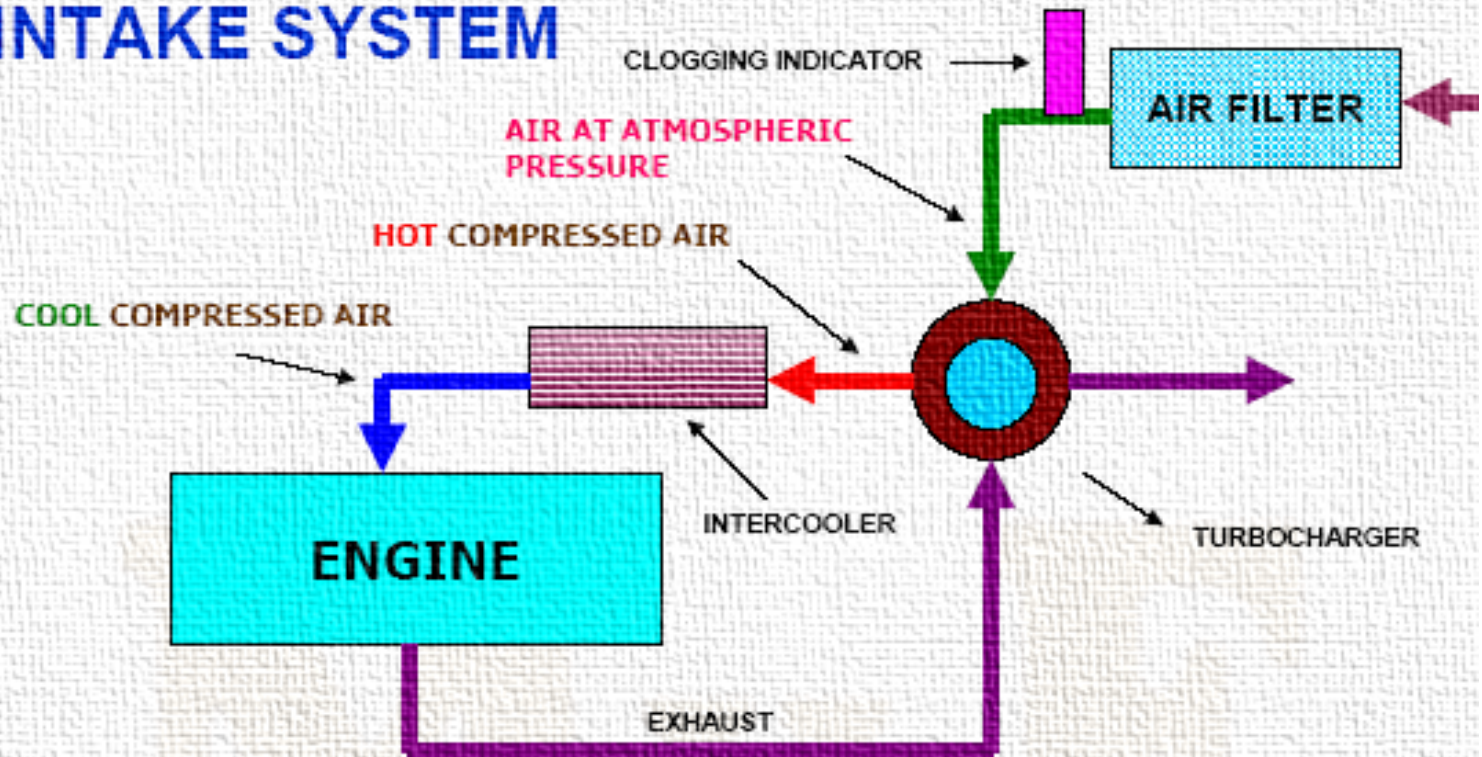
- **Inline FIP** - Has separate pumping chambers for each cylinder
- **Rotary FIP(Distributor pump)** - Has one pumping chamber and the pump distributes to each cylinder as per sequence- firing order

**2. INJECTORS** - Inject the high pressure fuel in to each cylinder.

**3. FUEL FILTER** - Filters the fuel from dirt & sediments, since the Fuel injection pump requires clean fuel.

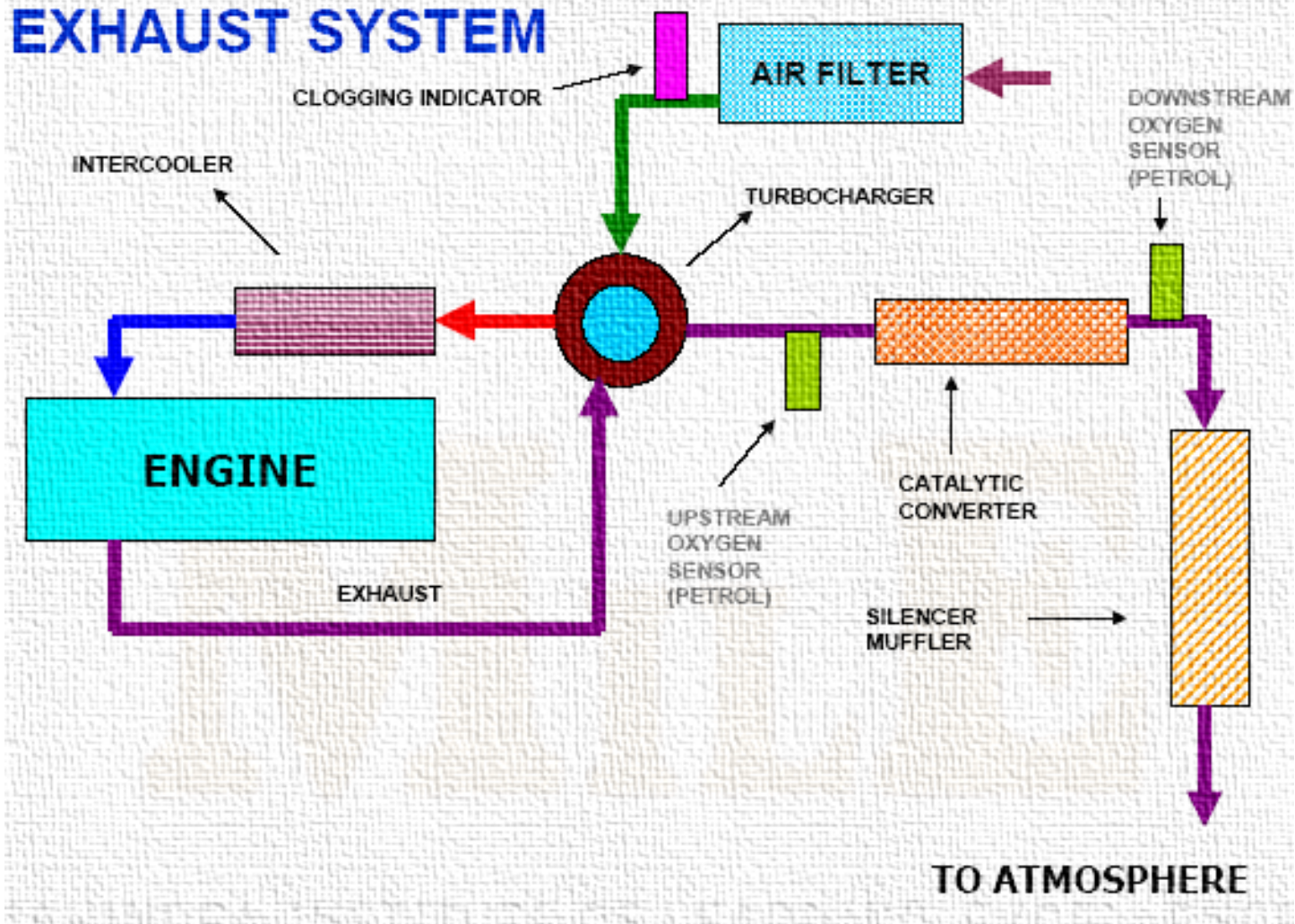


# INTAKE SYSTEM



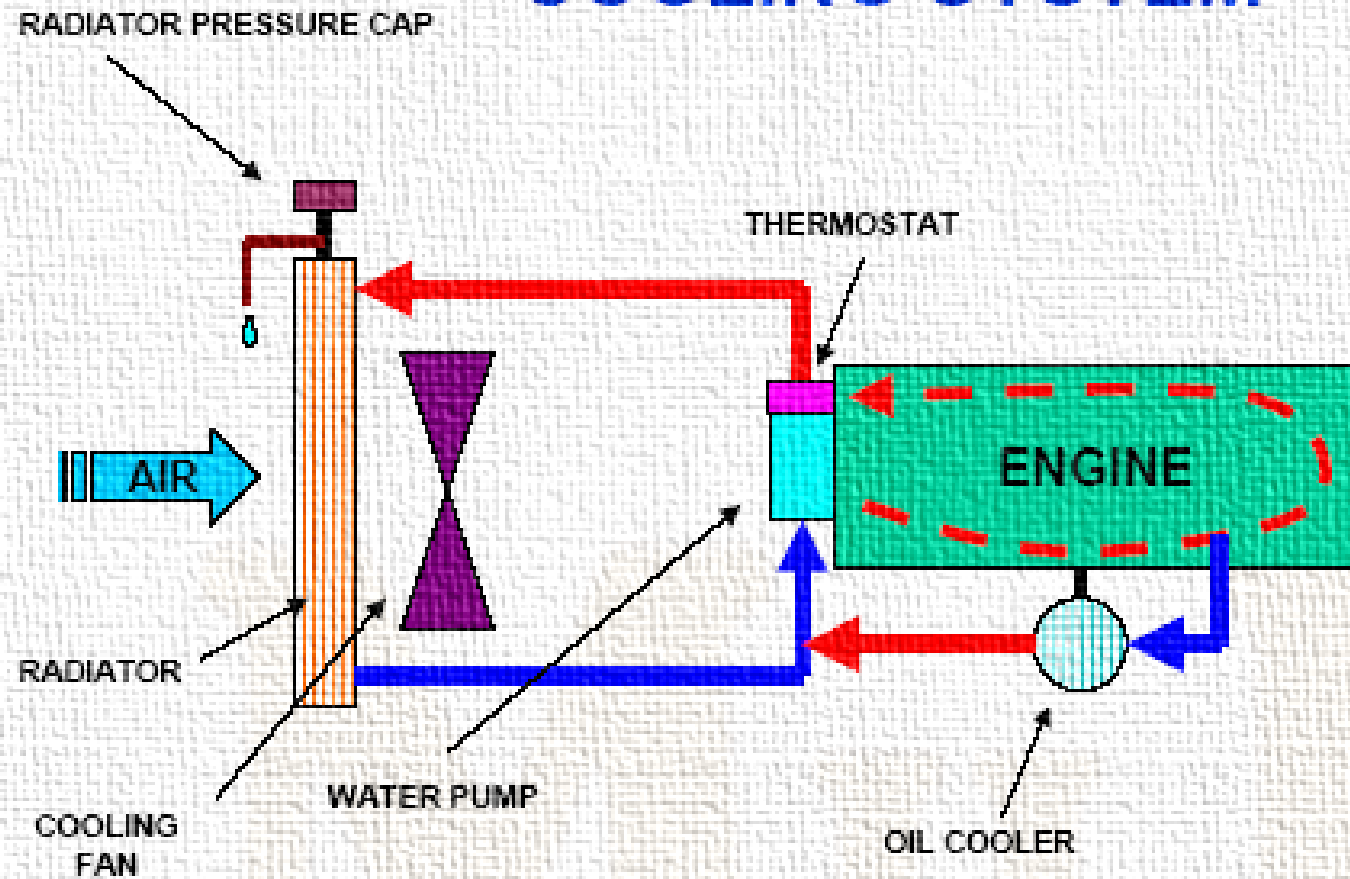


# EXHAUST SYSTEM

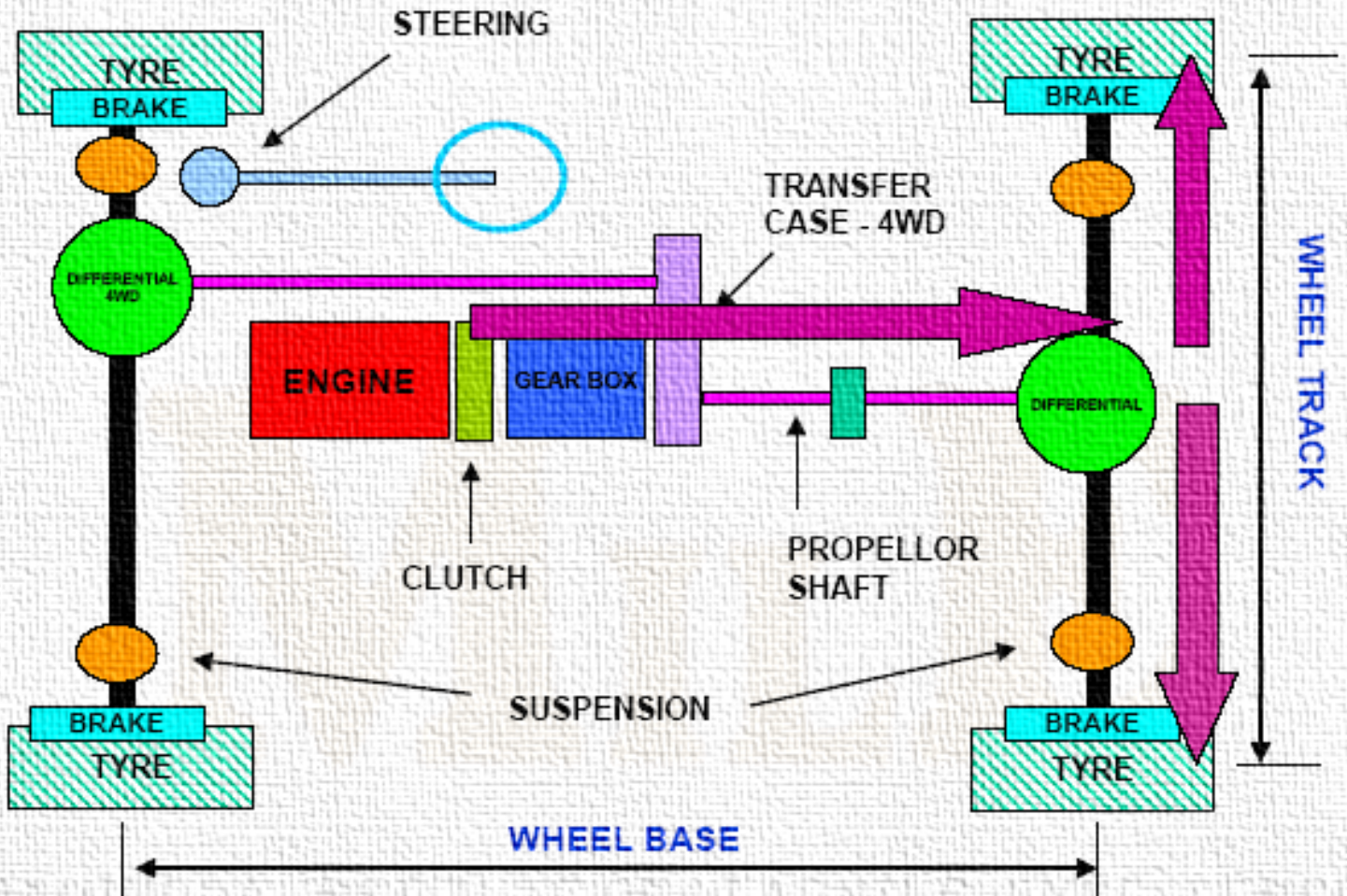




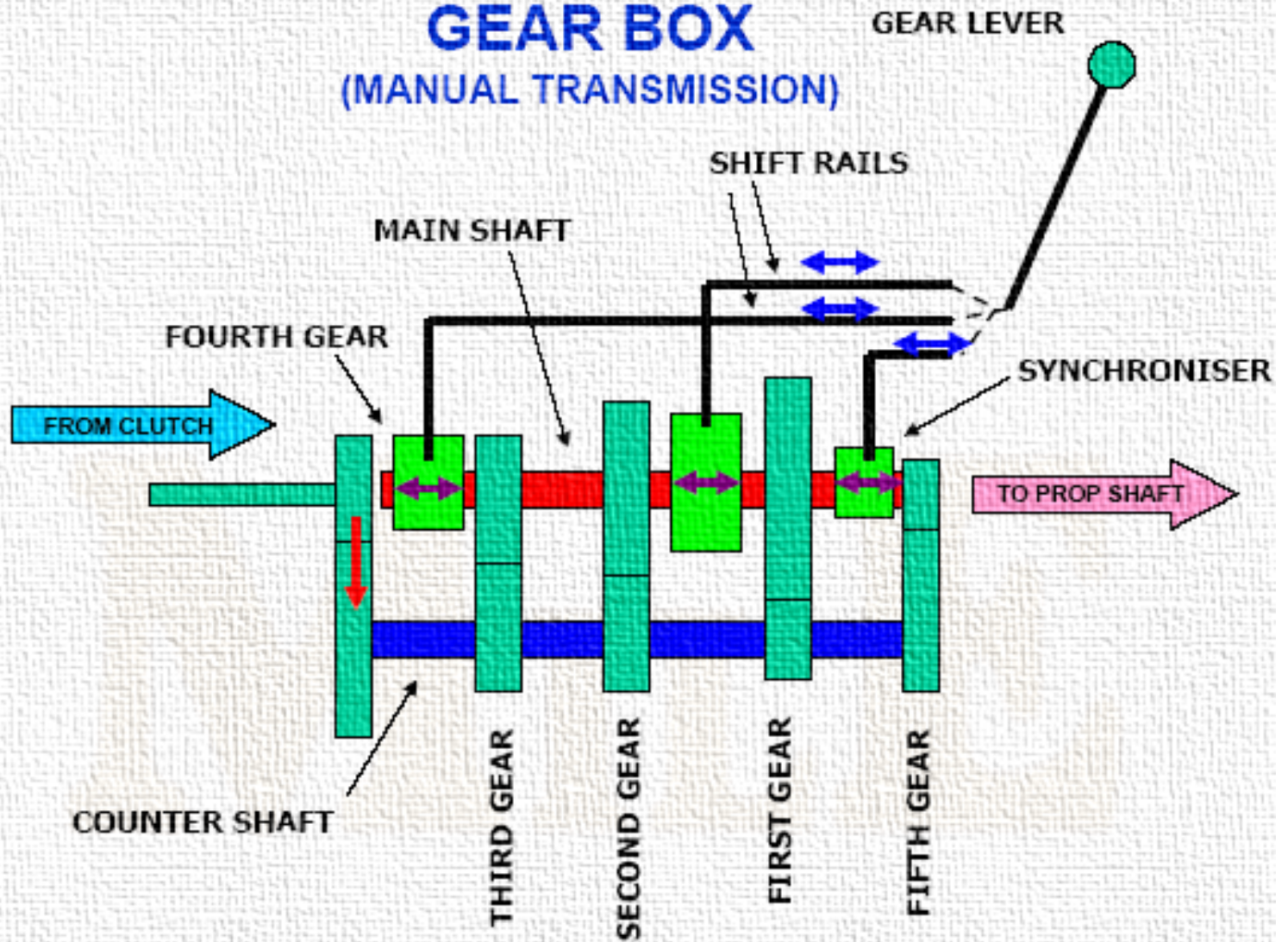
# COOLING SYSTEM



# ANATOMY OF AN AUTOMOBILE - DRIVELINE



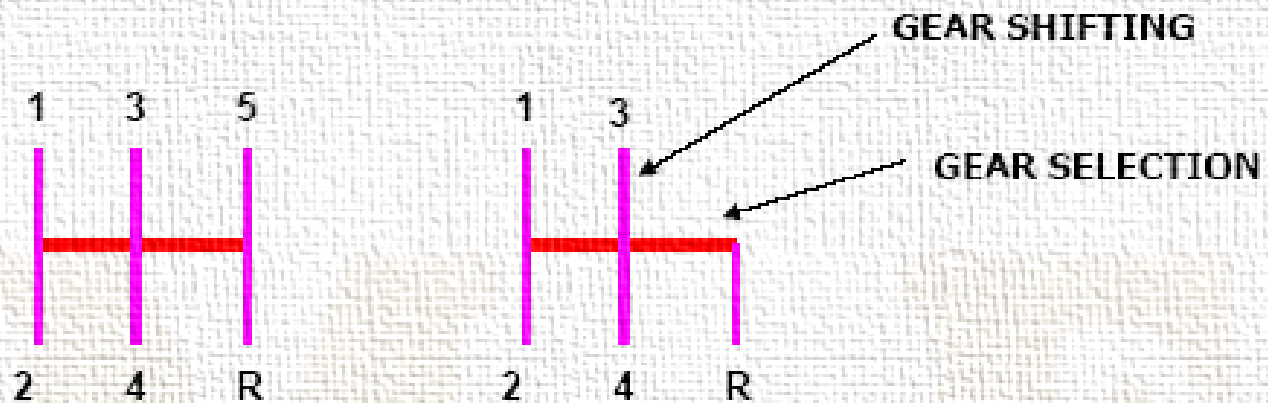
# GEAR BOX (MANUAL TRANSMISSION)





# GEAR BOX

**GEAR CHANGE MECHANISM(EXTERNAL)** - A desired gear ratio can be selected by the driver by **selecting and shifting** the gear lever



## 5 SPEED TRANSMISSION

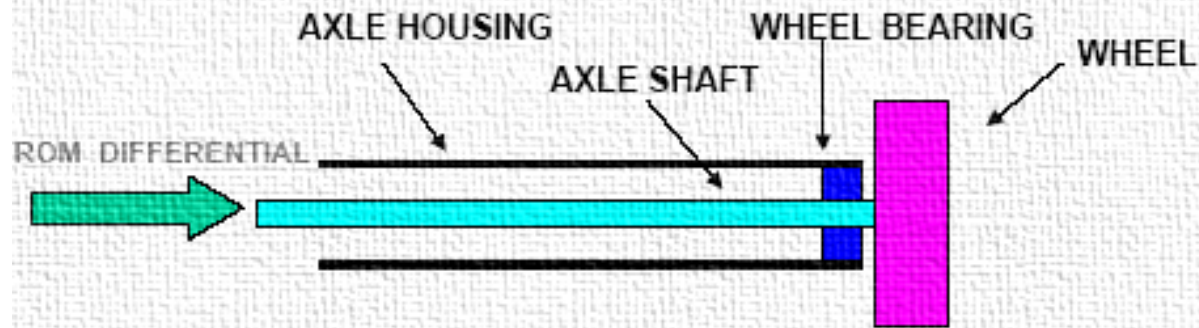
- BA10
- NISSAN
- ISUZU

## 4 SPEED TRANSMISSION

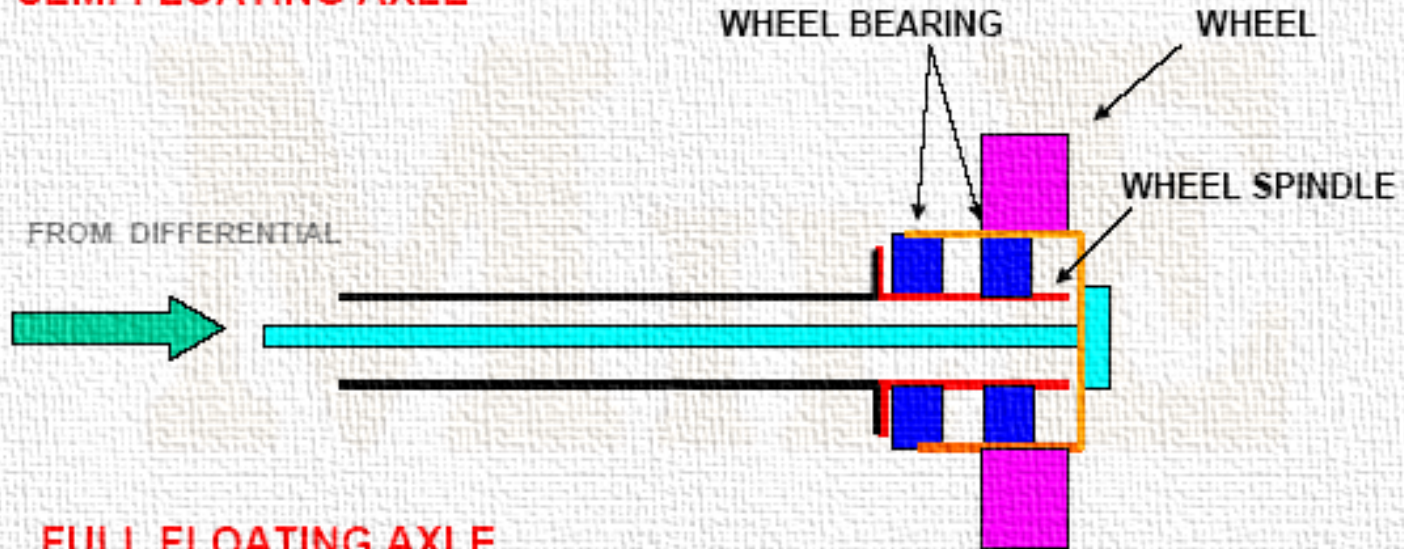
- KMT 90
- MS 90



# WHEELS



## SEMI-FLOATING AXLE



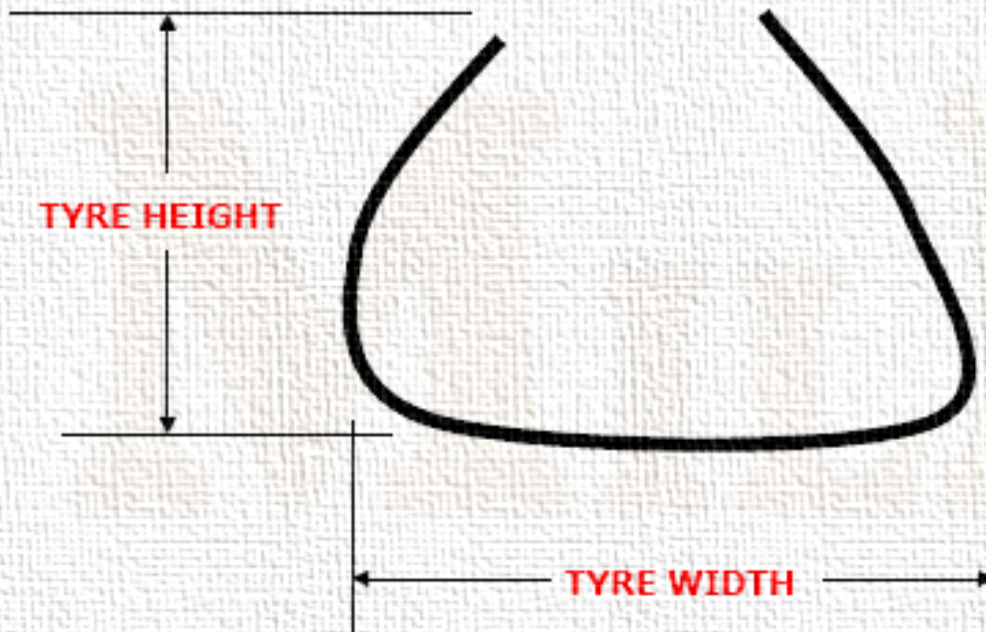
## FULL FLOATING AXLE



# TYRE

## TYRE SPECIFICATIONS

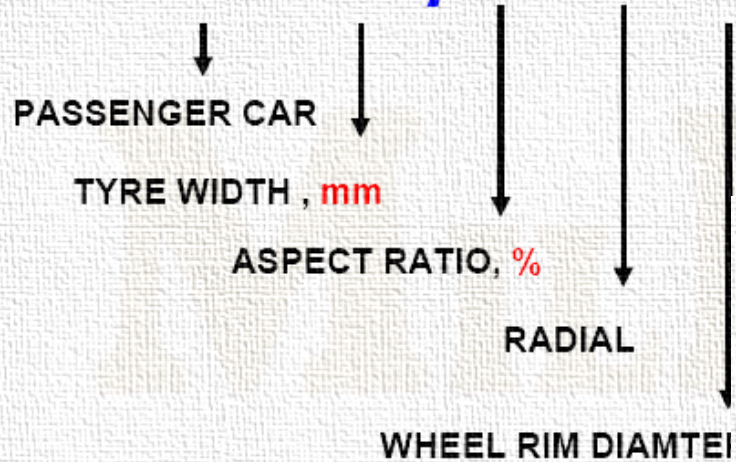
$$\text{ASPECT RATIO} = \frac{\text{TYRE HEIGHT}}{\text{TYRE WIDTH}} \times 100$$





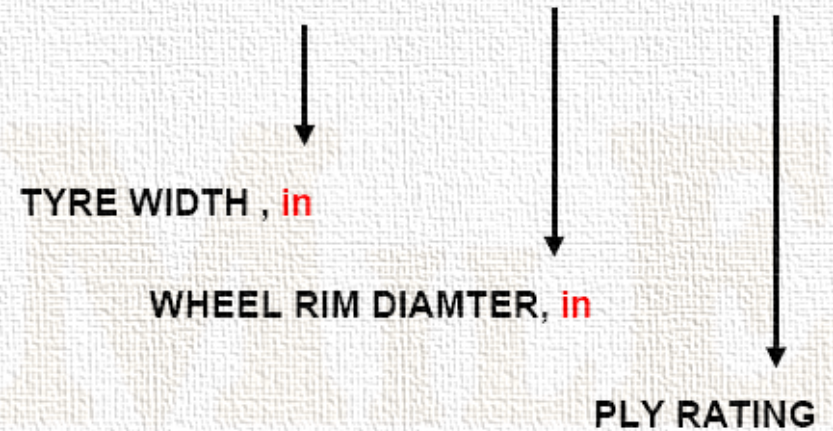
## TYRE SPECIFICATIONS

**P 235/75 R 15**



## TYRE SPECIFICATIONS

**6.00 X 16 8 PR**



Thank You

