

به نام خدا

سیستم‌های شاسی و بدنه خودرو

انواع خودرو از نظر جانمایی موتور و چرخهای محرک

دوره کارشناسی ارشد مهندسی خودرو
دانشگاه علم و صنعت ایران

Automobile layout

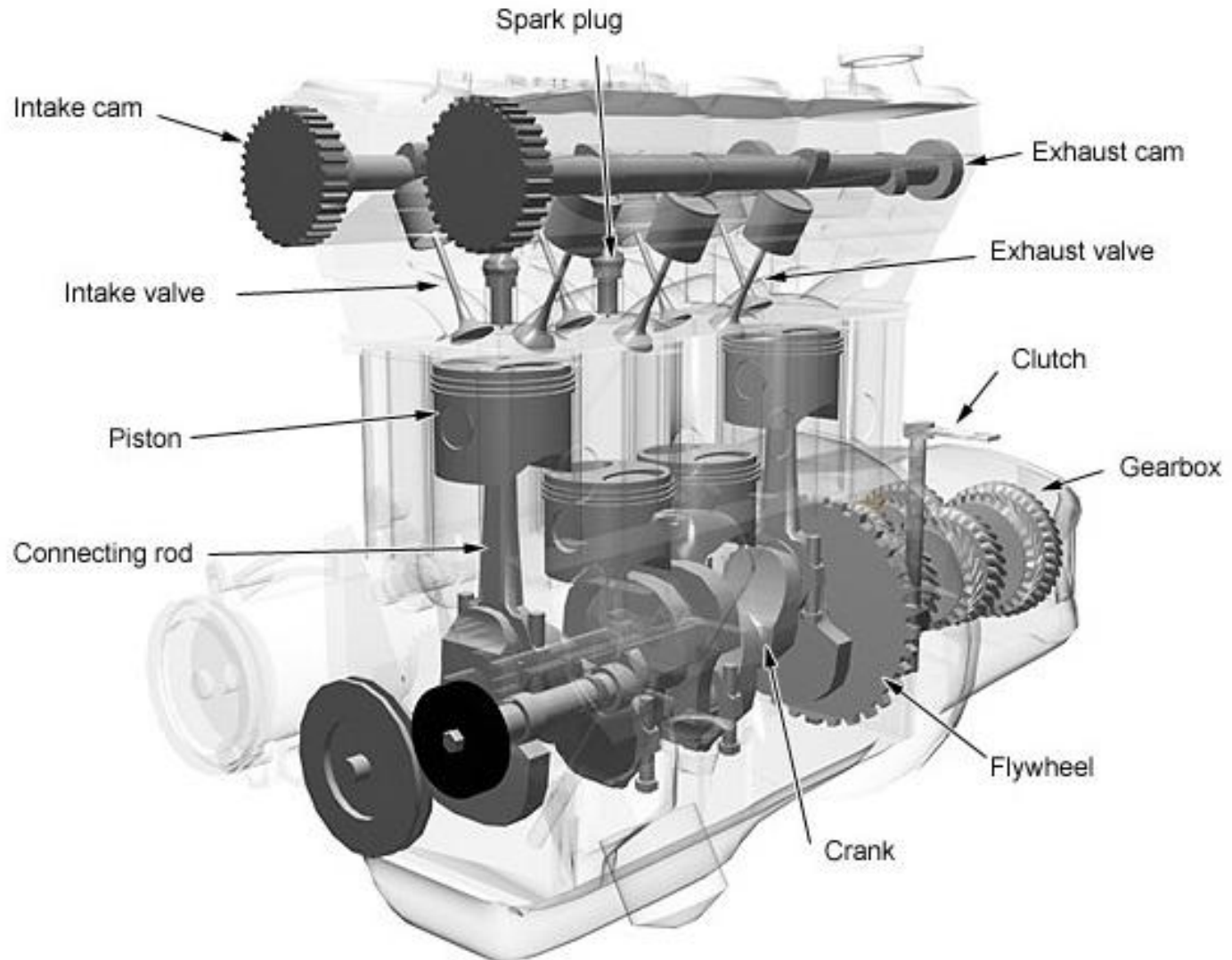
- Positioning of the drive wheels
 - Rear-wheel drive (RWD)
 - Front-wheel drive (FWD)
 - Four-wheel-drive (4WD), All-wheel drive (AWD)
- Factors influencing the design and relative positioning of engine and drive wheels:
 - application of the vehicle
 - weight distribution
 - handling characteristics
 - Aerodynamic profile
 - packaging
 - complexity
 - reliability
 - cost

Standard vs. Non-standard Layouts

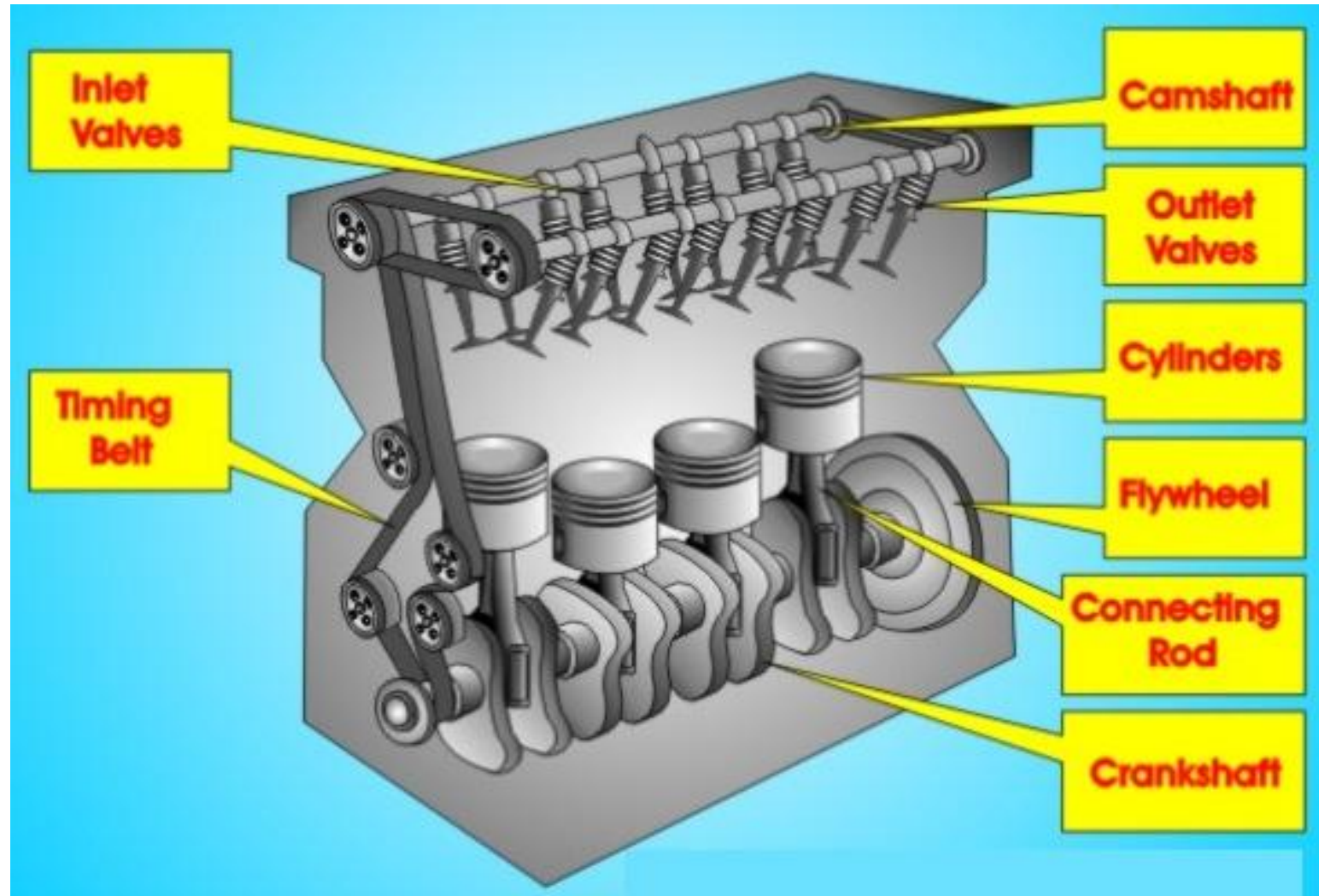
Based on the positioning of the engine and drive wheels:

- Standard
 - the engine is placed in the front of the vehicle and the drive wheels are located at the rear
- Non-Standard
 - the engine is placed at the rear of the vehicle
 - the drive wheels are located in the front of the vehicle

Engine Components



Engine Components



Engine (Cylinders) Layouts



Single



V-Twin



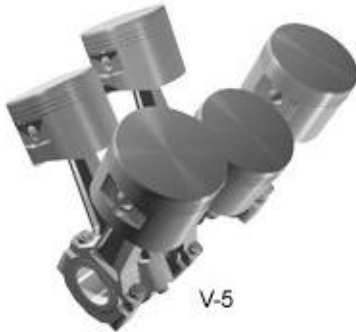
Triple



Straight-4 or In-line-4



Straight-5



V-5



V-6



V-8



Boxer Twin



Flat-4



Flat-6

Engine Mount

- A **longitudinal engine** is an internal combustion engine in which the **crankshaft** is oriented along the **long axis** of the vehicle.
- A **transverse engine** is an engine mounted in a vehicle so that the engine's **crankshaft** axis is perpendicular to the **long axis** of the vehicle.

Rear-wheel drive (RWD)

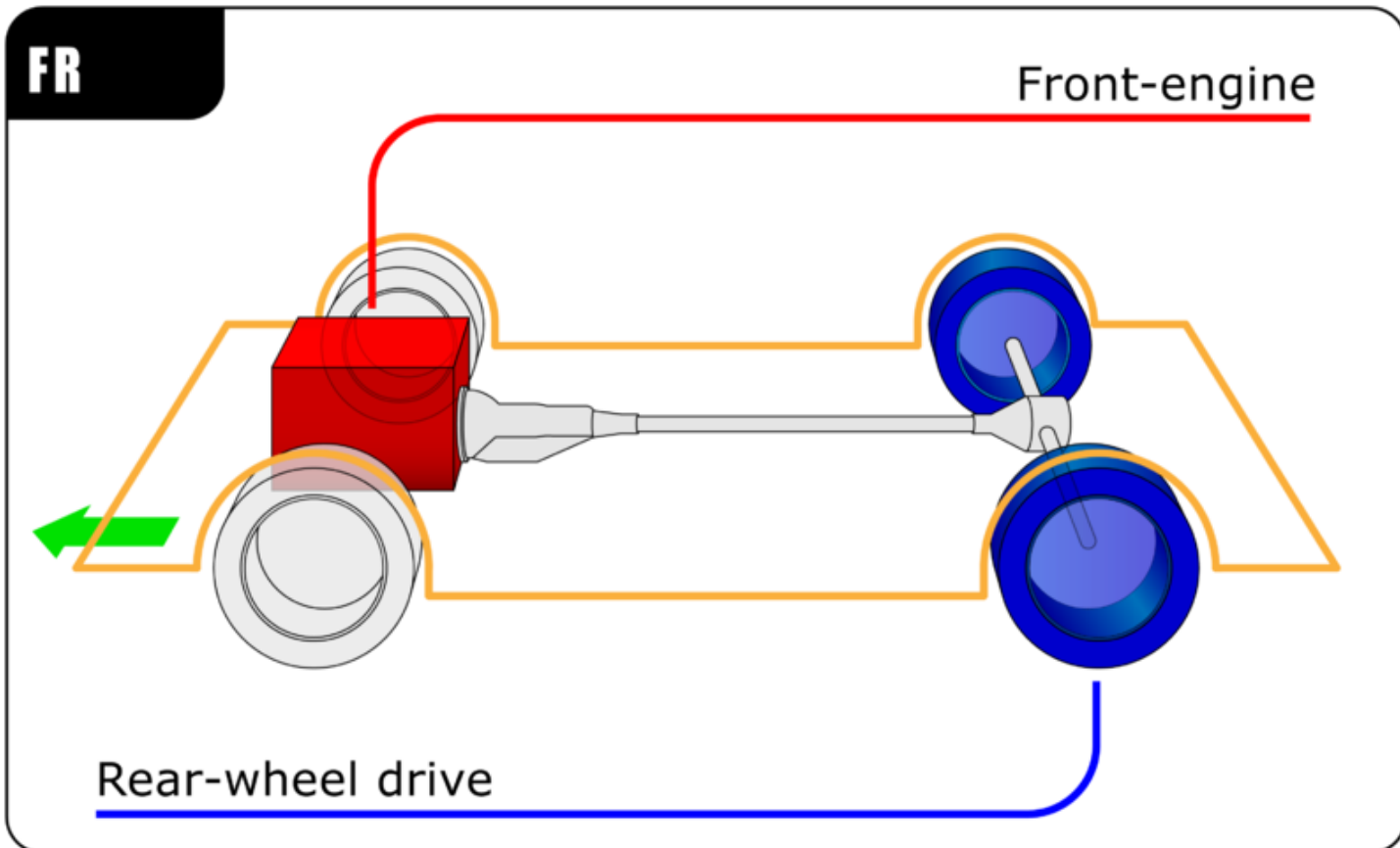
- Typically, the engine is placed in the front of the vehicle and the drive wheels are located at the rear (most vehicles until the 1970s and 1980s)

Layouts:

- Front-engine, rear-wheel drive (FR layout)
- Front mid-engine, rear-wheel drive (FMR layout)
- Rear mid-engine, rear-wheel drive (RMR layout)
- Rear engine, rear-wheel drive (RR layout)

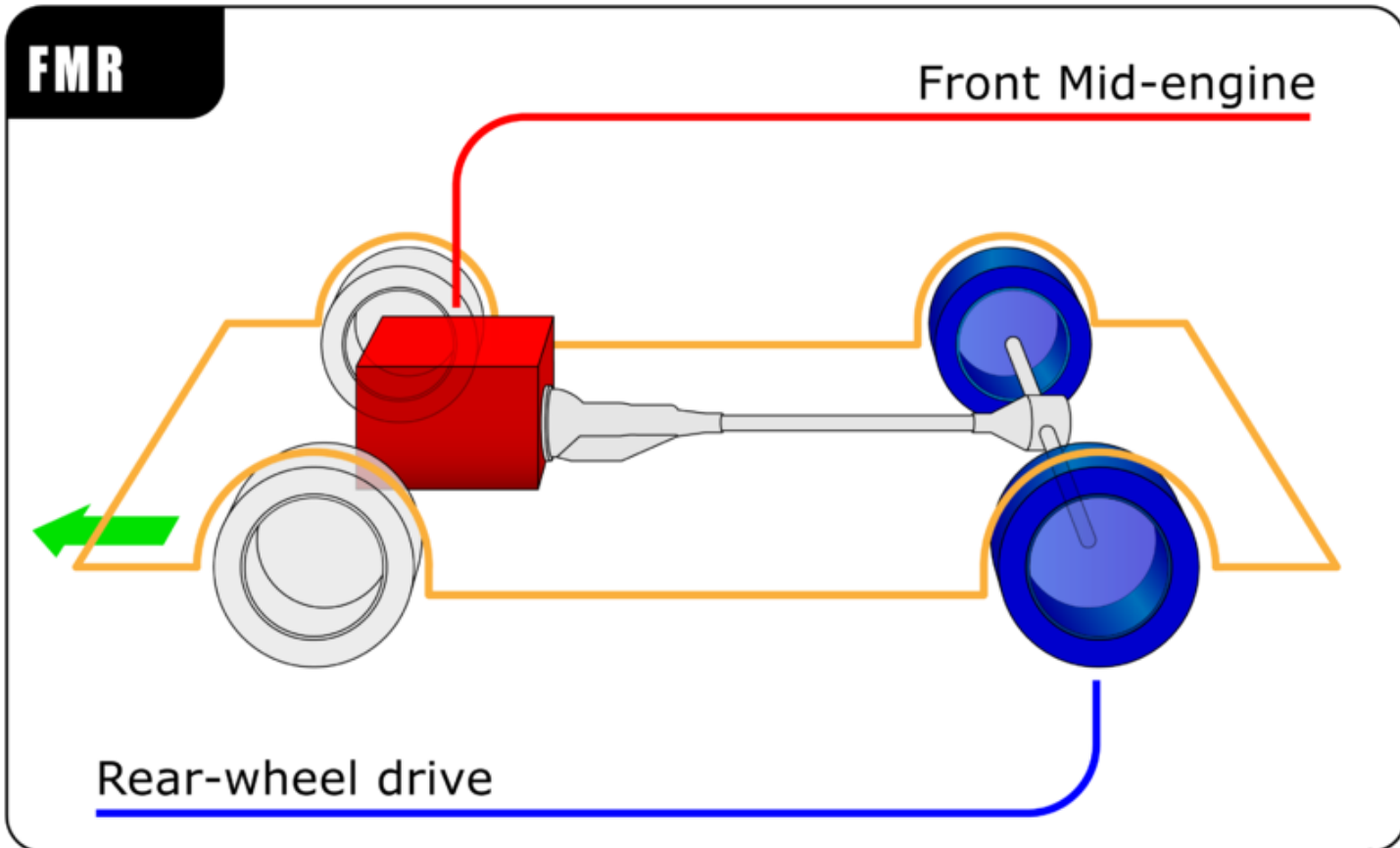
Rear-wheel drive (RWD)

- Front-engine, rear-wheel drive (FR layout)



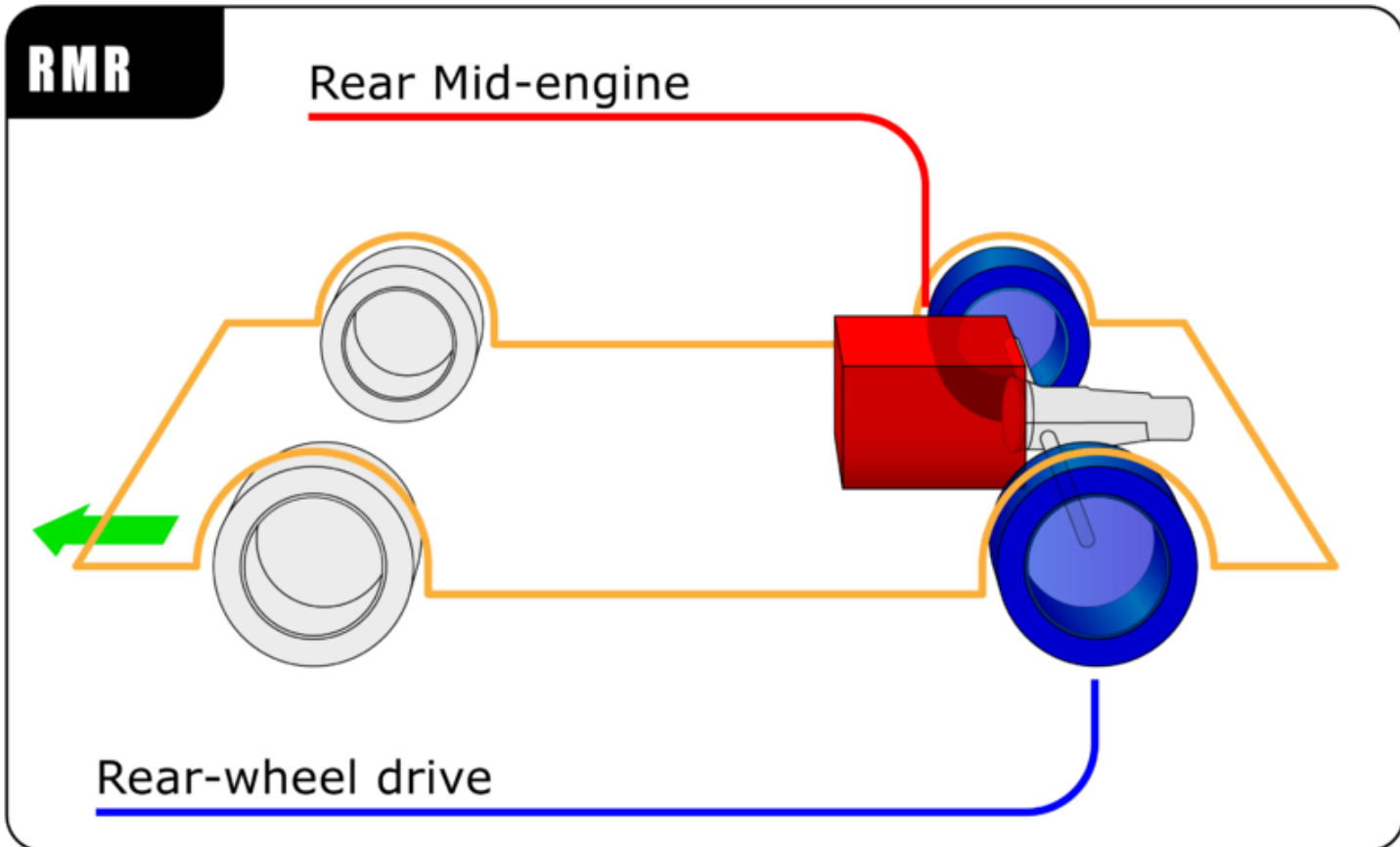
Rear-wheel drive (RWD)

- Front mid-engine, rear-wheel drive (FMR layout)



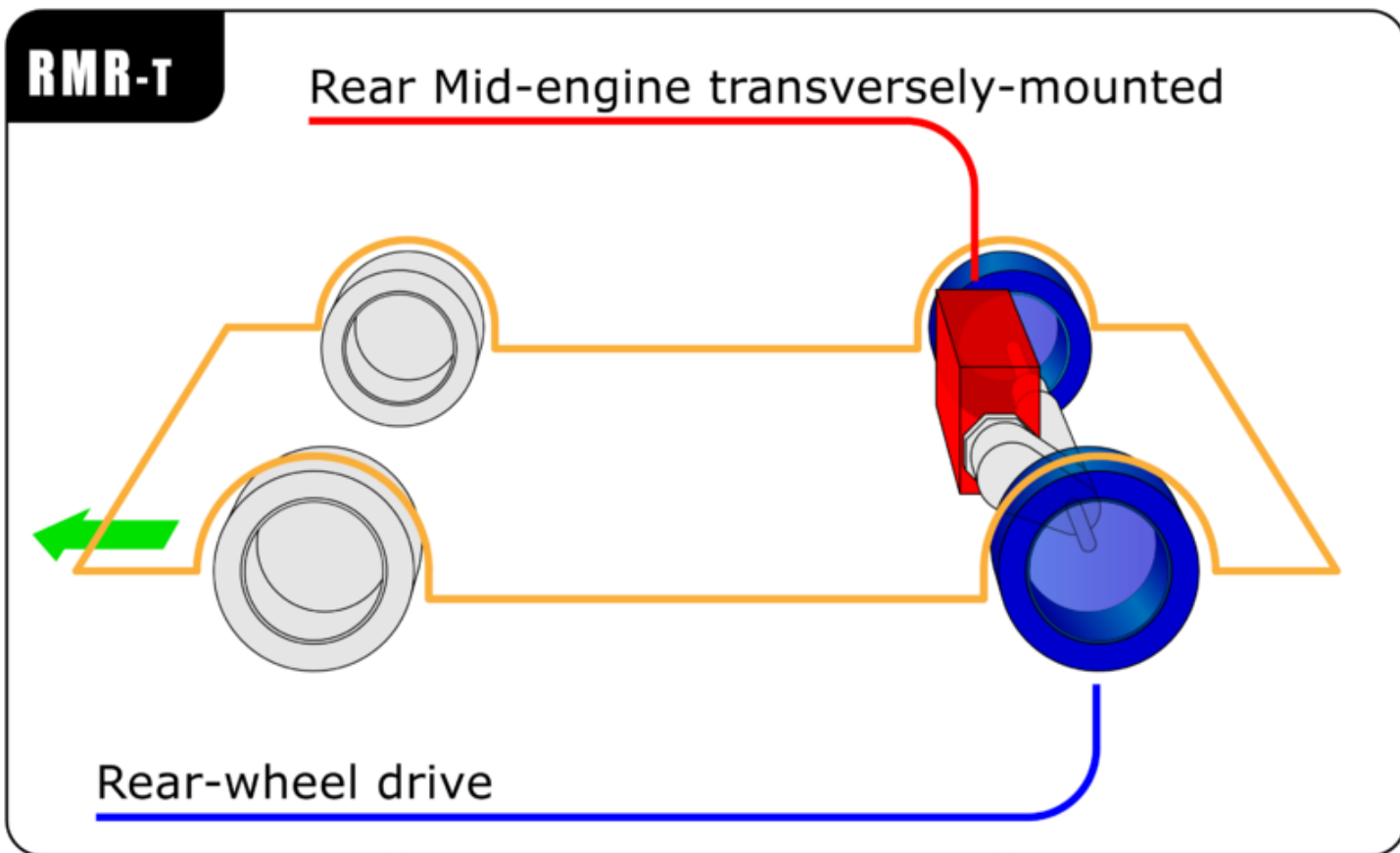
Rear-wheel drive (RWD)

- Rear mid-engine, rear-wheel drive (RMR layout)



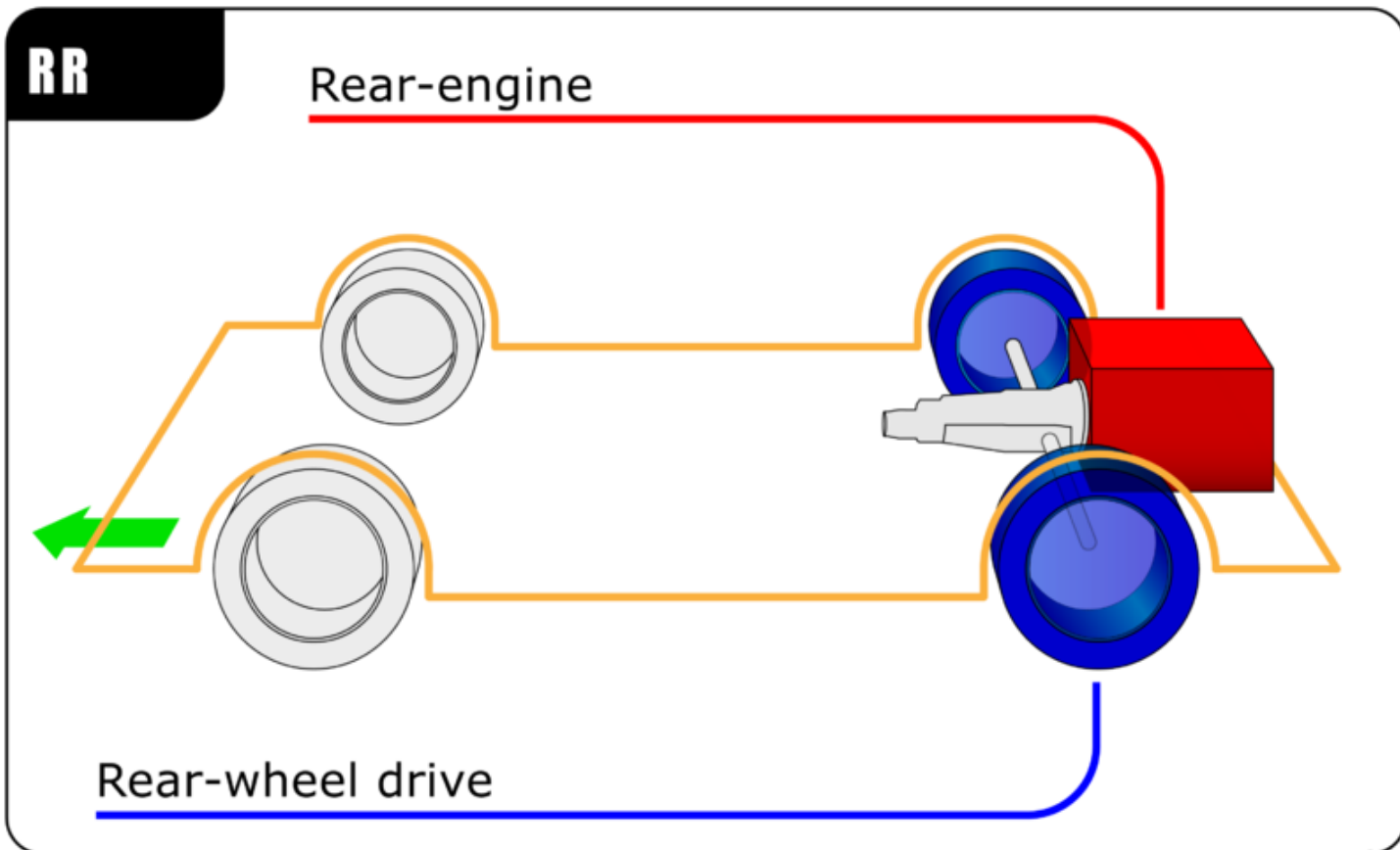
Rear-wheel drive (RWD)

- Rear mid-engine (Transversely Mounted), rear-wheel drive (RMR layout)



Rear-wheel drive (RWD)

- Rear engine, rear-wheel drive (RR layout)



Front-wheel drive (FWD)

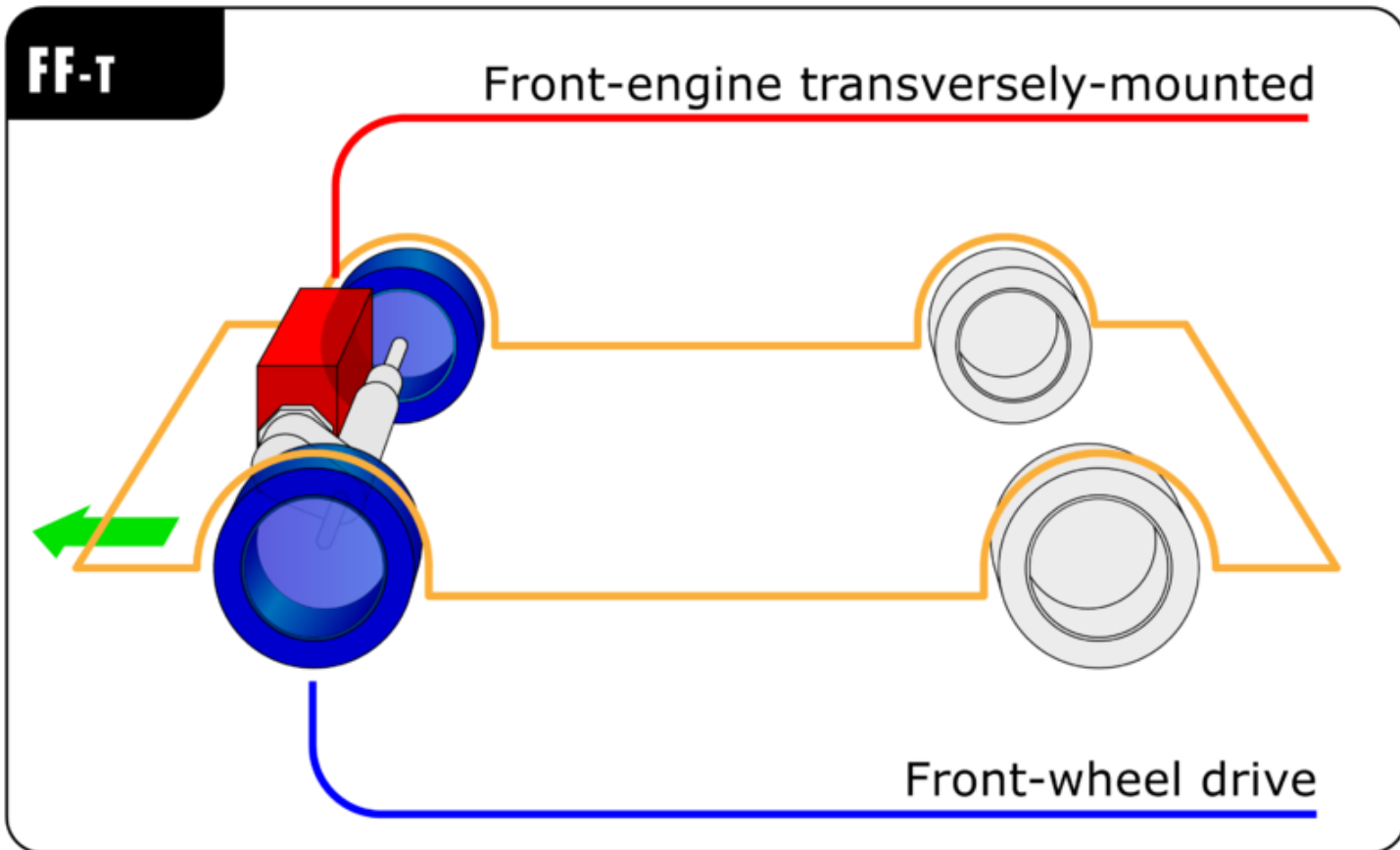
- Front wheels of the vehicle are driven. The engine is usually mounted in front of the front axle.
- The most popular layout used in passenger cars today
- This layout is typically chosen for its compact packaging

Layouts:

- Front-engine (Transverse), Front-wheel drive (FF-T layout)
- Front-engine (Longitudinal), Front-wheel drive (FF-L layout)
- Front-mid-engine, Front-wheel drive (MF layout)

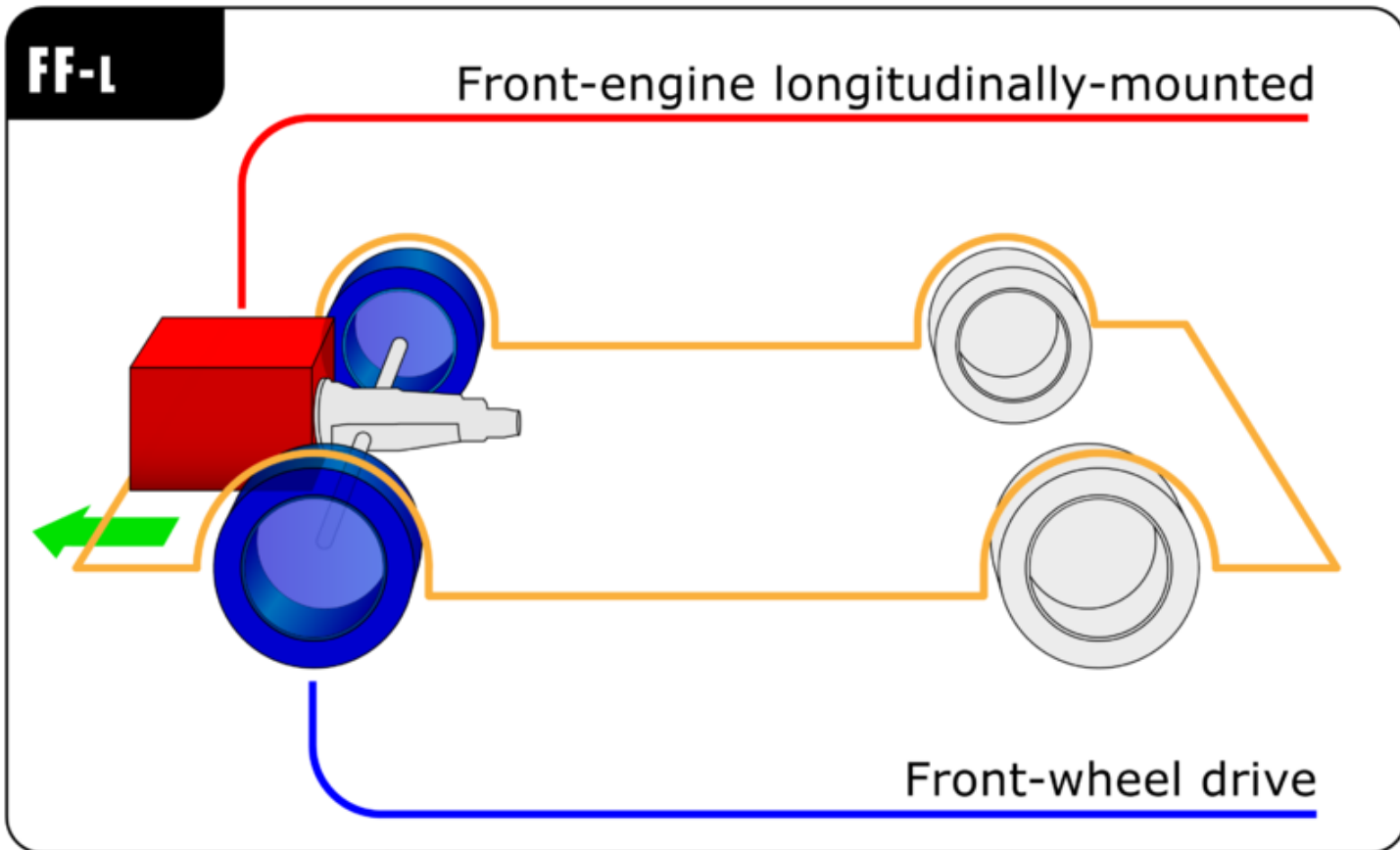
Front-wheel drive (FWD)

- Front-engine (Transversely Mounted), Front-wheel drive (FF-T layout)



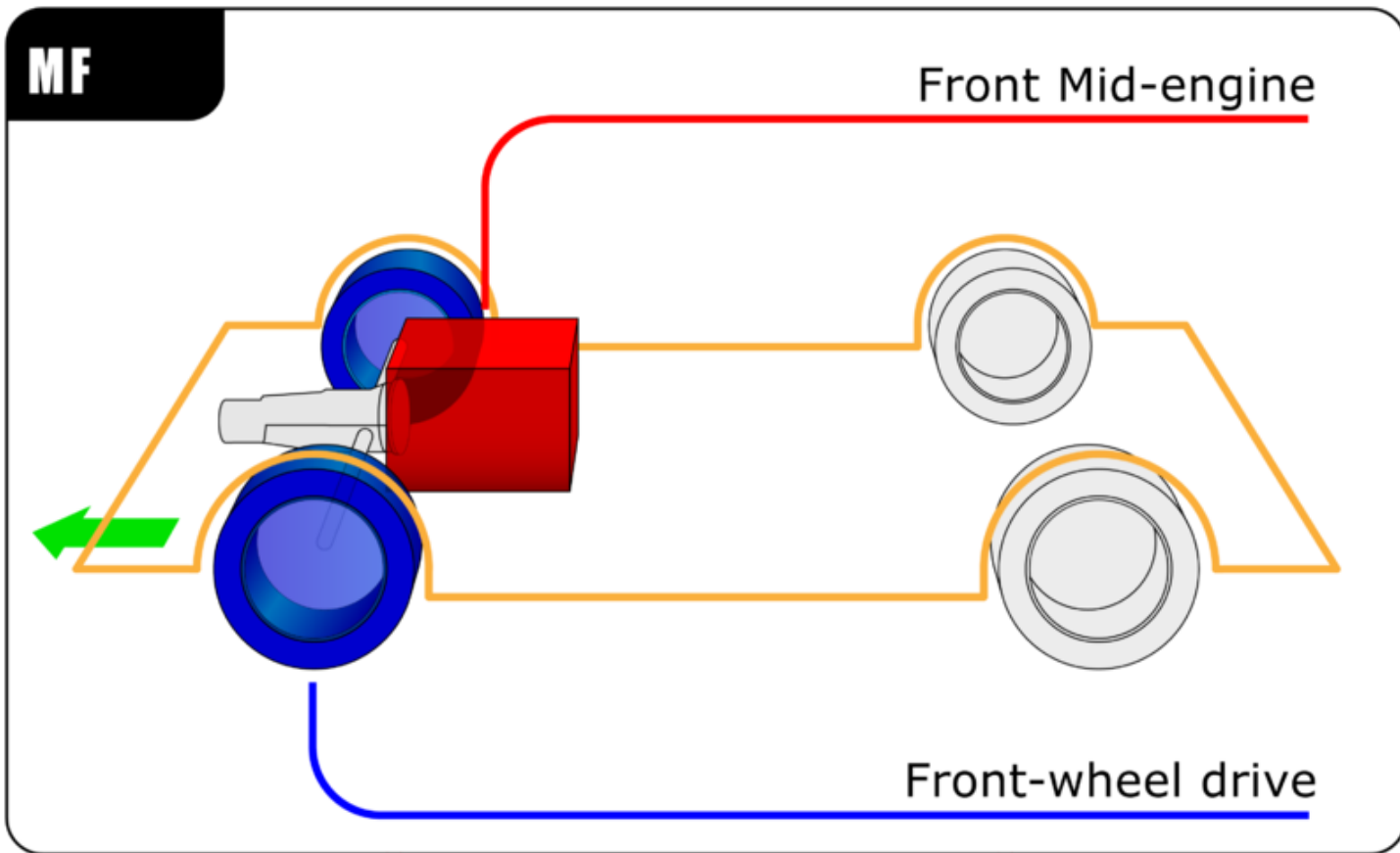
Front-wheel drive (FWD)

- Front-engine (Longitudinally Mounted), Front-wheel drive (FF-L layout)



Front-wheel drive (FWD)

- Front-mid-engine, Front-wheel drive (MF layout)



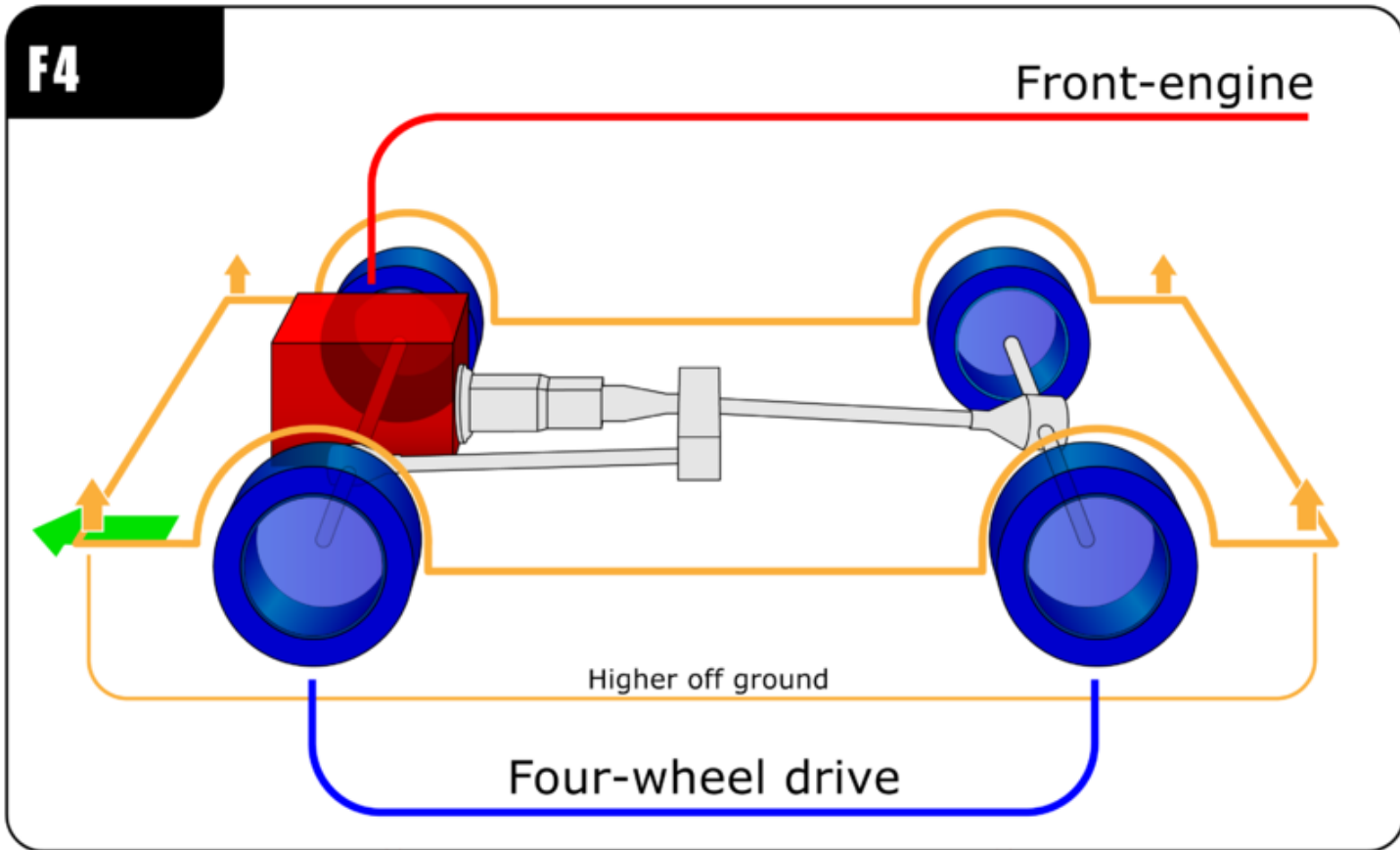
Four-wheel drive (4WD)

- Most 4WD layouts are front-engine.
- However rear-engine layouts are also used

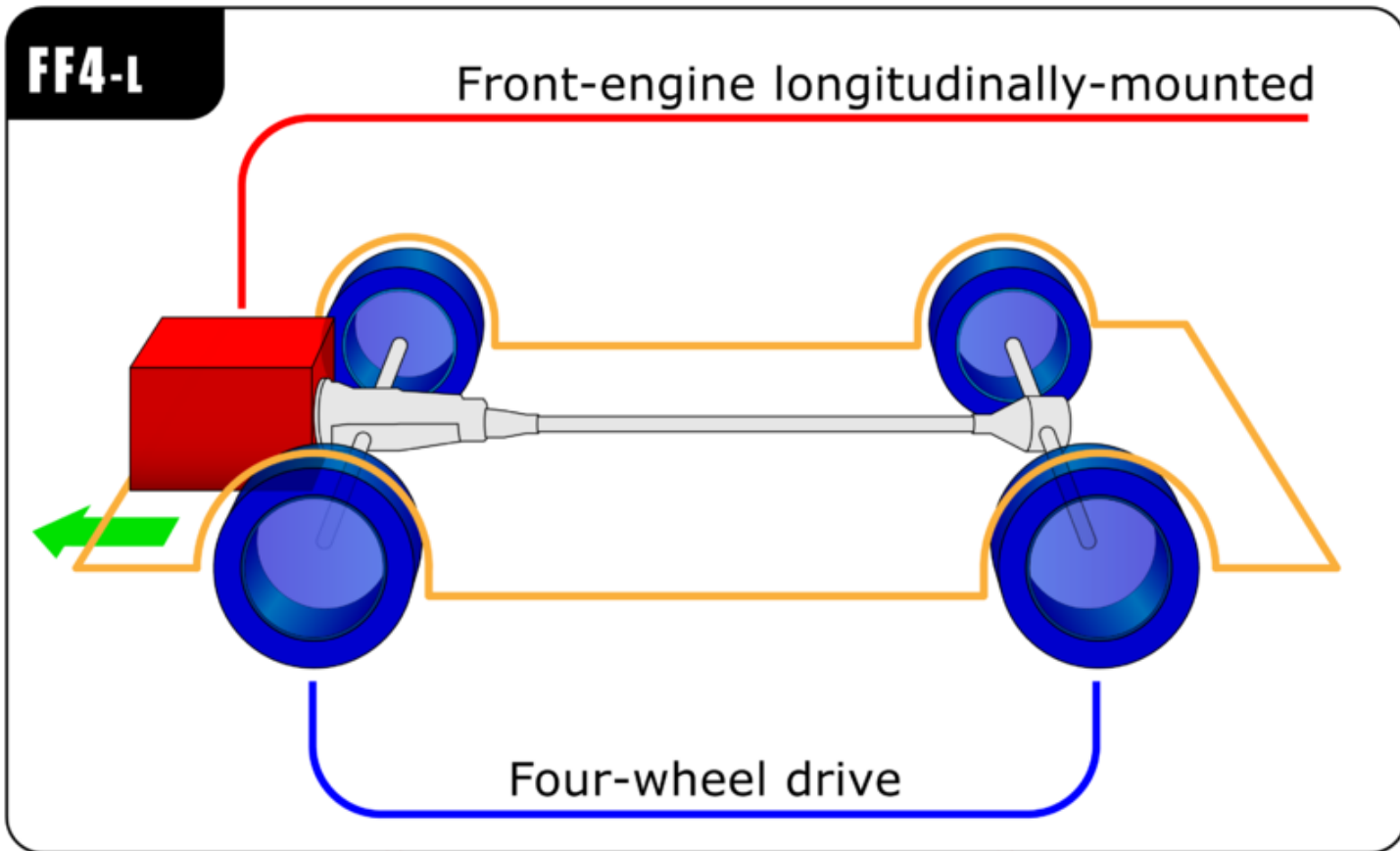
Layouts:

- Front-engine, four-wheel drive (F4 layout)
- Rear-engine, four-wheel drive (R4 layout)
- Full-front-engine (L), four-wheel drive (FF4-L layout)
- Full-front-engine (T), four-wheel drive (FF4-T layout)

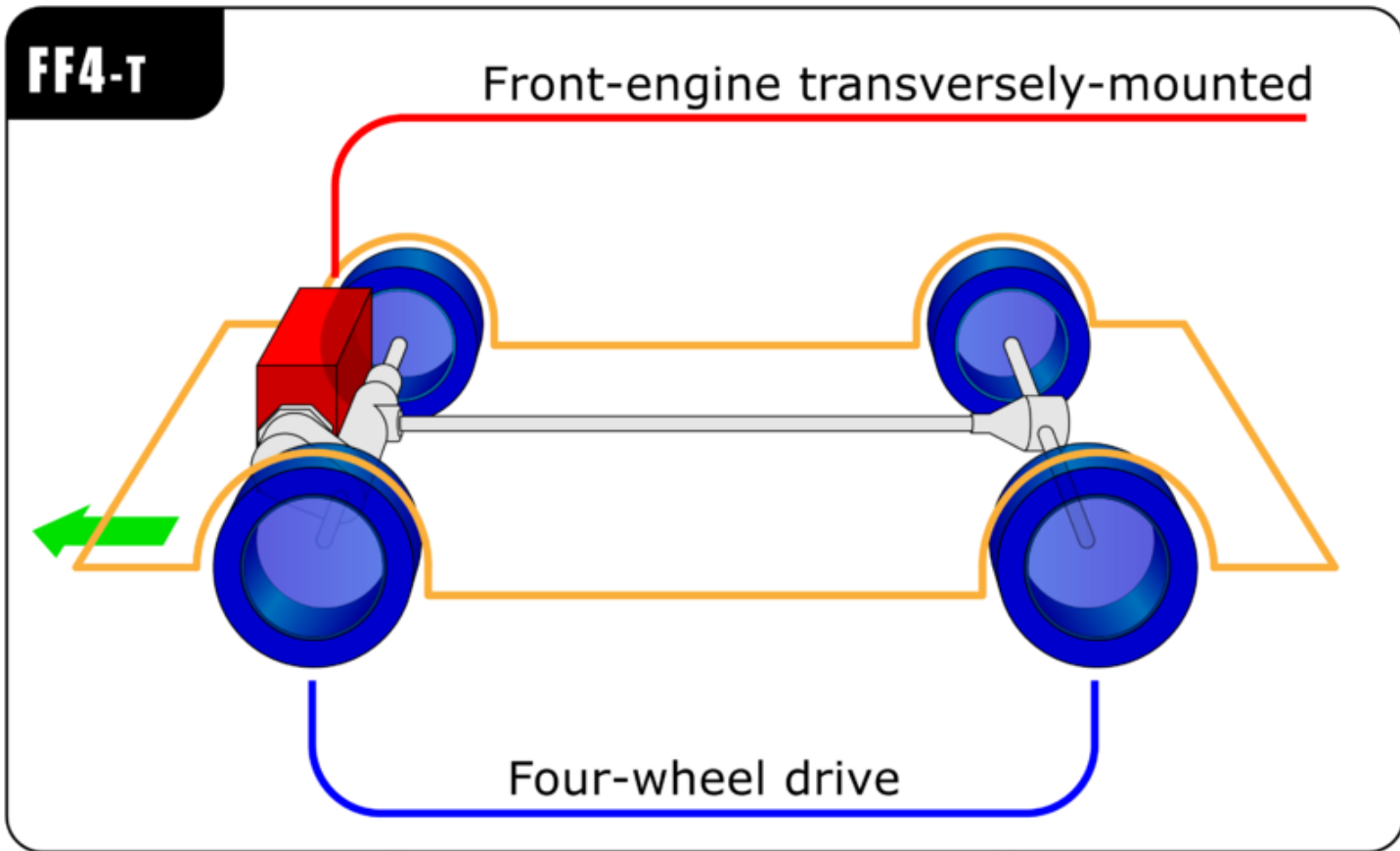
Four-wheel drive (4WD)



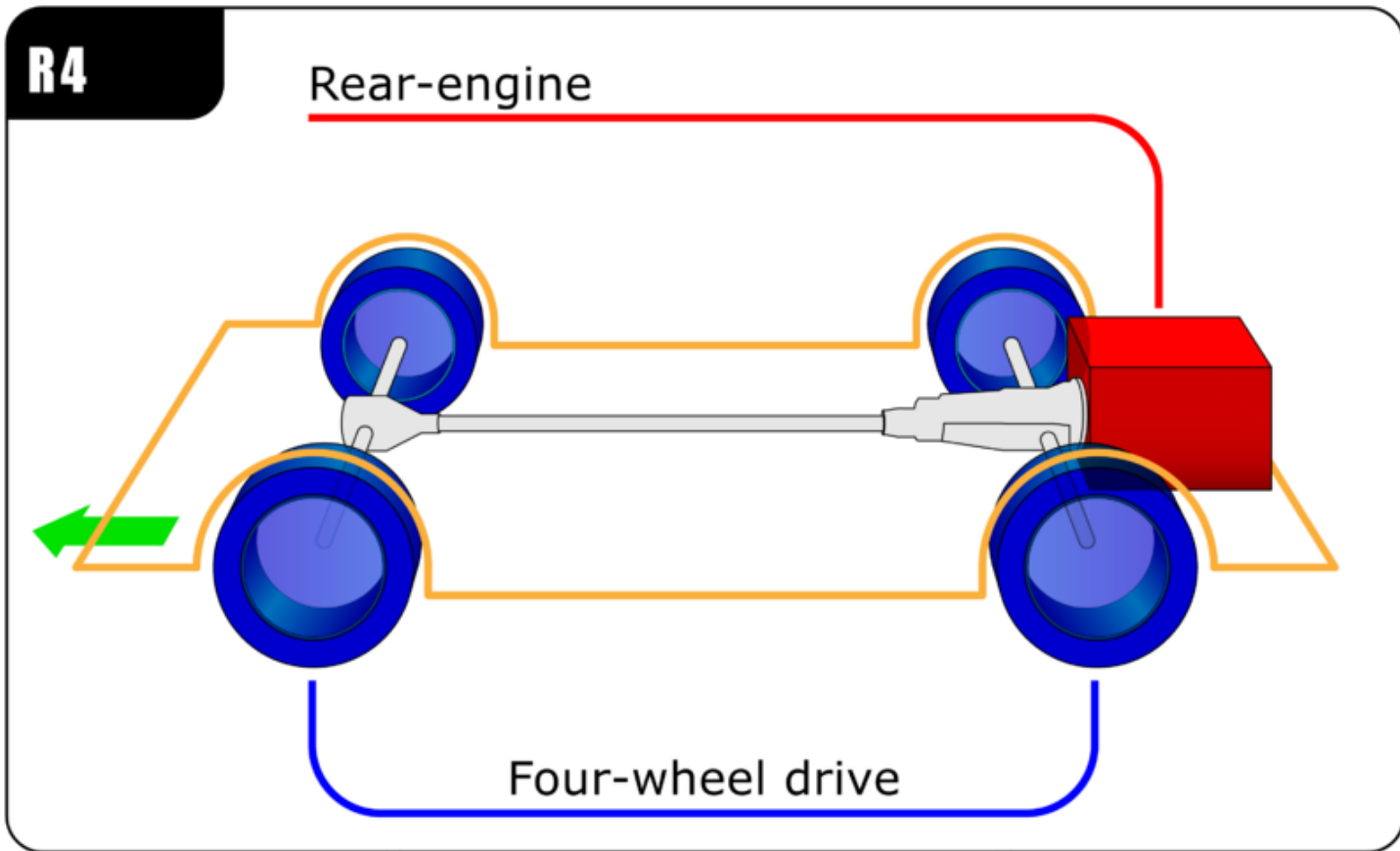
Four-wheel drive (4WD)



Four-wheel drive (4WD)



Four-wheel drive (4WD)

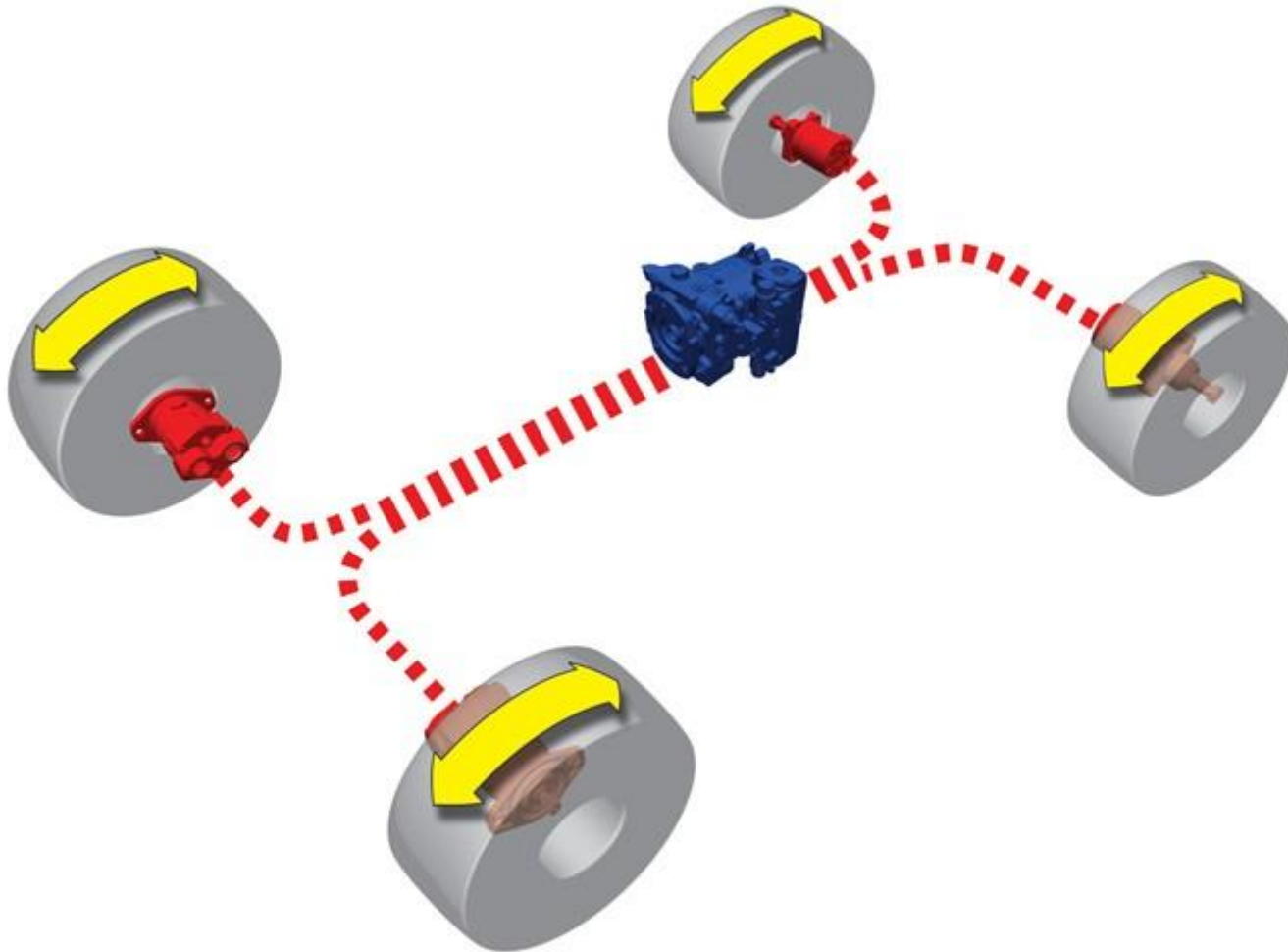


Individual-wheel drive (IWD)

- In electrical vehicles where each wheel is driven by its own individual electric motor.
- Drivetrain allows wheels to receive torque from several motors independent of each other.
- Wheel hub motors are commonly used in these vehicles, no central gear box or transmission components are then required.



Individual-wheel drive (IWD)



Individual-wheel drive (IWD)

Mercedes-Benz SLS AMG E-CELL

