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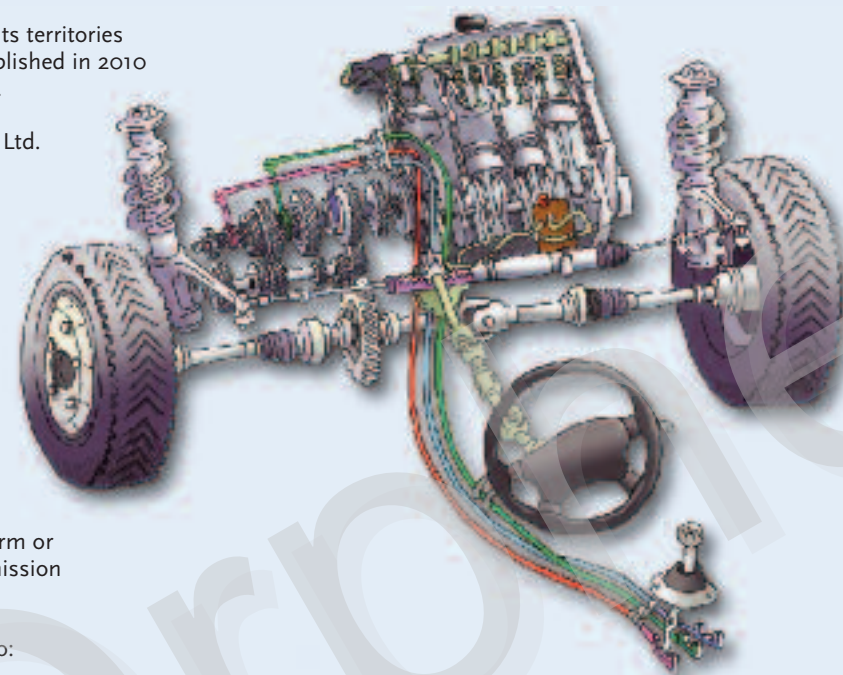
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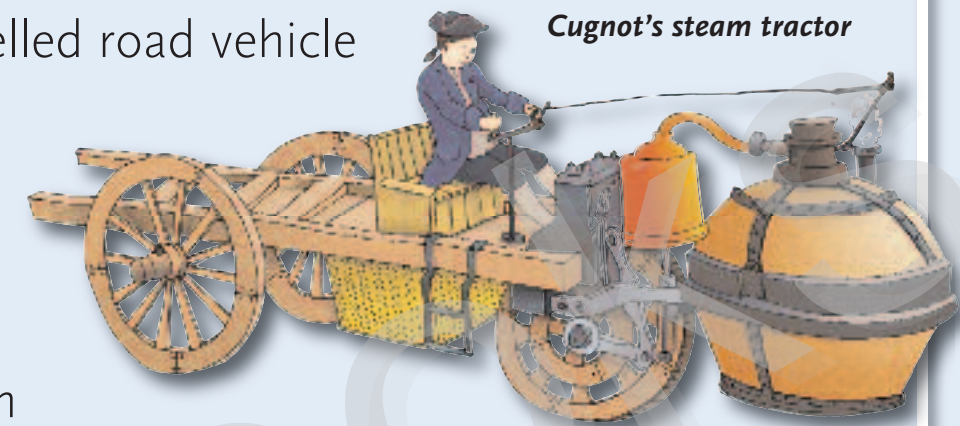
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# THE FIRST CARS

**T**he first self-propelled road vehicle was a tractor designed to pull heavy guns. It was



*Cugnot's steam tractor*

built by Frenchman



*Benz 1885 car*

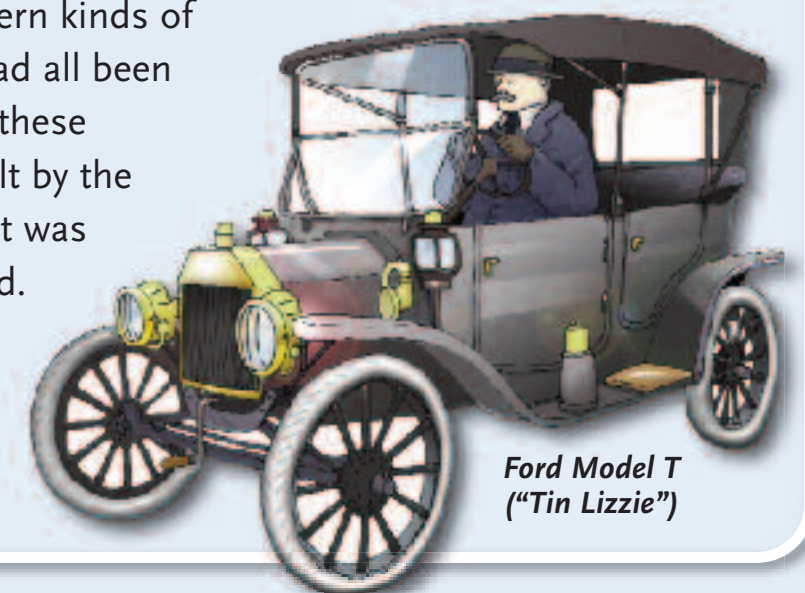
Nicolas Cugnot in 1769. Powered by a steam engine, the machine had a top speed of 2 1/2 mph. The first real cars arrived with the invention of the internal combustion engine. German engineer Karl Benz built the first gasoline-driven car in 1885. Its rear wheels were connected to the

*Mercedes 35 hp*



engine by belts and chains. Early four-wheeled cars were known as "horseless carriages."

By the beginning of the 1900s, modern kinds of engines, tires, gears, and steering had all been invented. The first car to include all these features was the *Mercedes 35 hp*. Built by the German company Daimler in 1901, it was a luxury car only the rich could afford. The first inexpensive car appeared in 1908. Large numbers of the Ford Model T were built by the American Ford company in a factory.

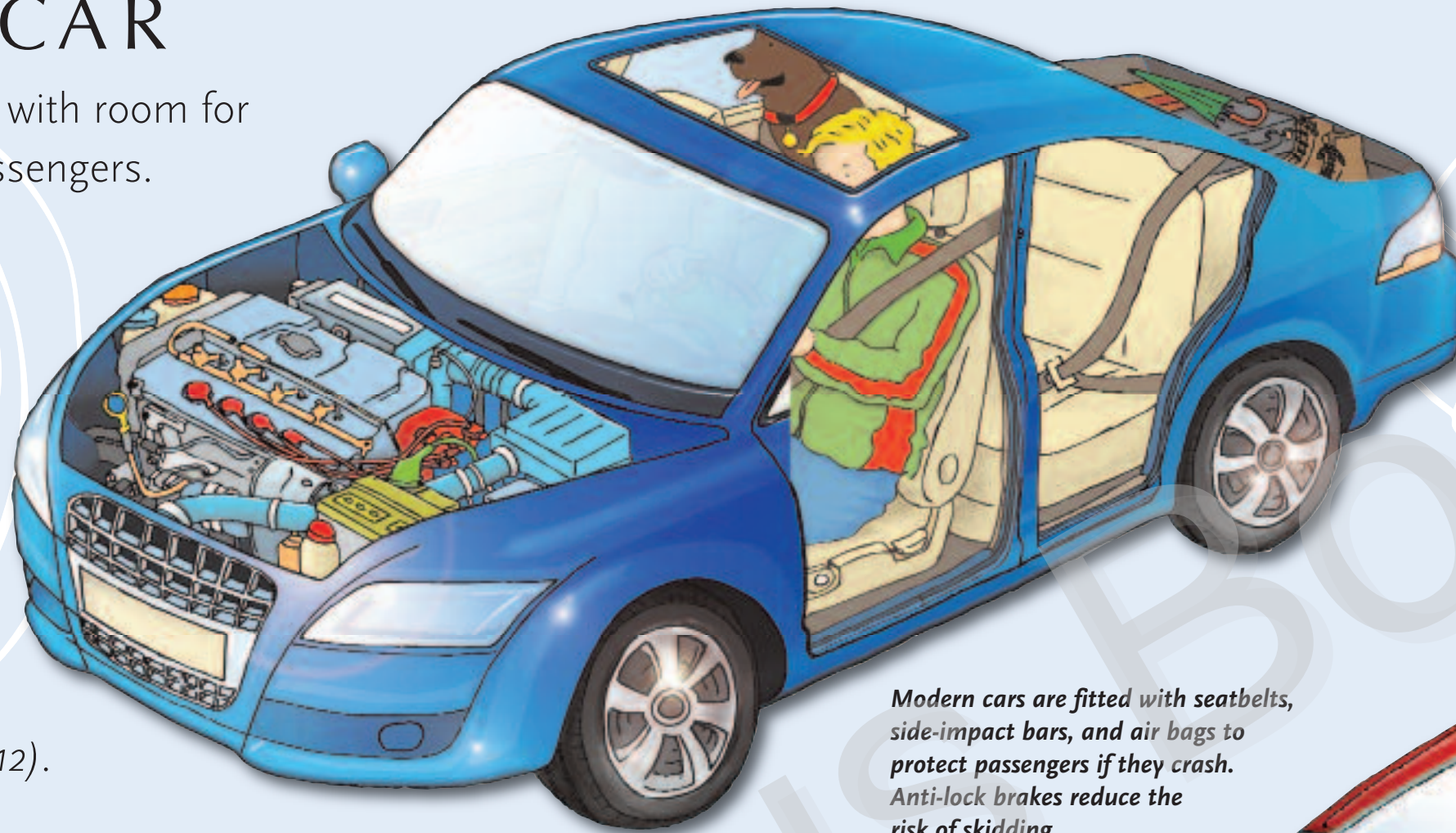


*Ford Model T ("Tin Lizzie")*

# TYPES OF CAR

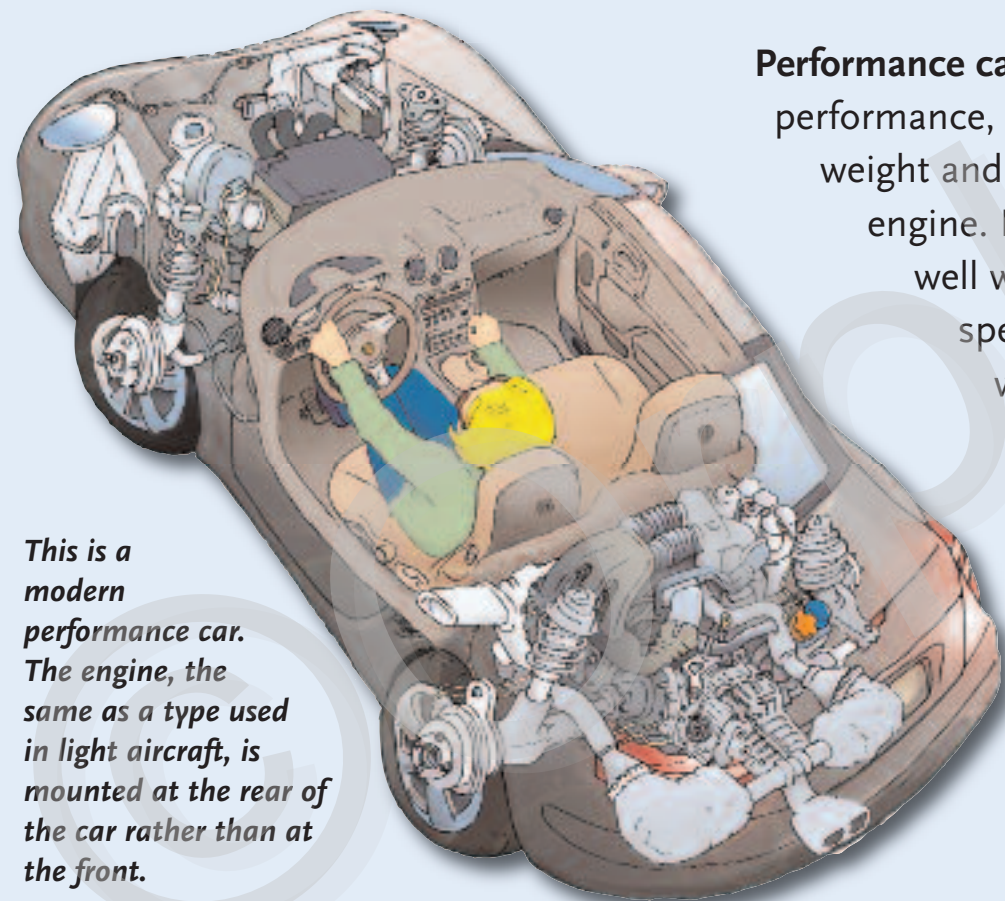
**C**ars are small vehicles with room for a driver and a few passengers.

Sedan cars have a separate trunk, hatchbacks have room for luggage behind the back seat, while station wagons have a larger space for carrying extra loads. Some cars are specially designed for speed, including racing (see page 12).



A modern car is powered by an internal combustion engine fueled by gasoline or diesel fuel (see page 8). The engine is usually at the front of the car, mounted at right angles to the direction in which the car travels. The driver can make the car go faster by pressing the gas pedal, which increases the power from the engine. The car slows down when the brake pedal is pressed.

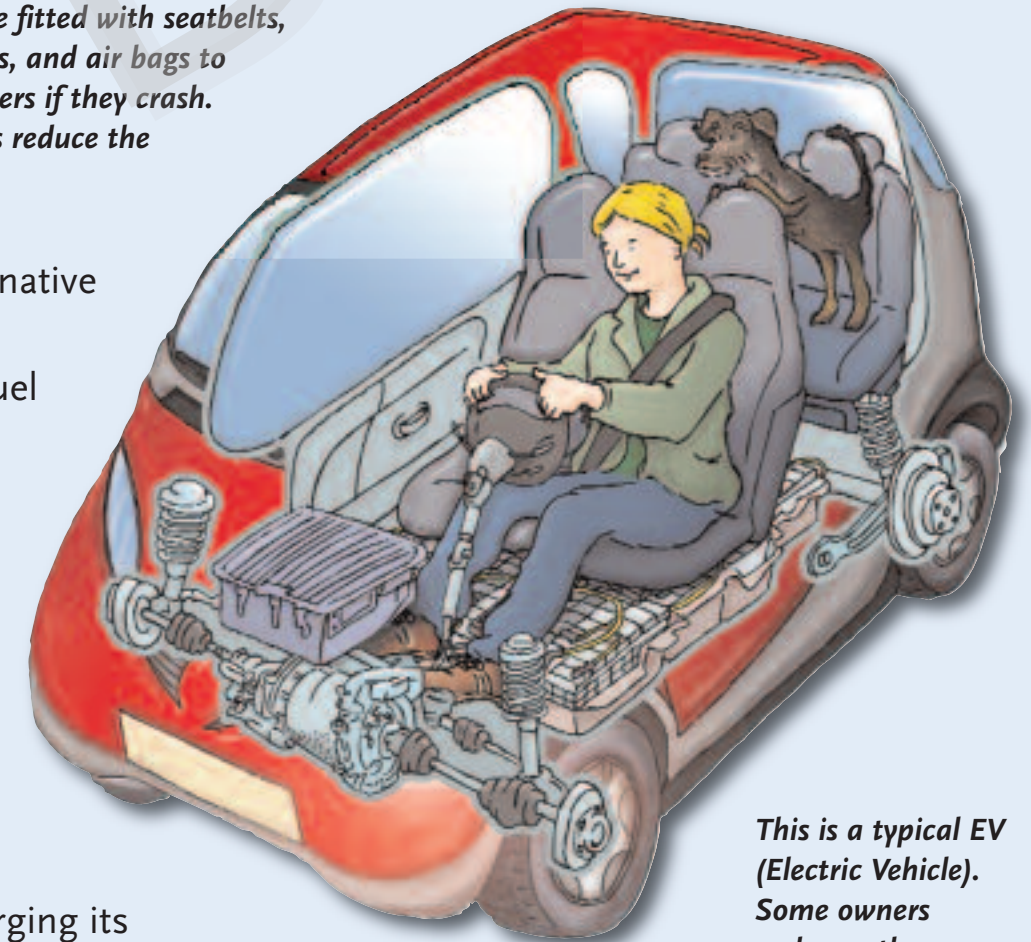
*Modern cars are fitted with seatbelts, side-impact bars, and air bags to protect passengers if they crash. Anti-lock brakes reduce the risk of skidding.*



**Performance car** A modern sports, or performance, car is usually light-weight and has a high-powered engine. It can hold the road well when cornering at speed. Many are four-wheel drive: all four wheels are powered directly by the engine.

A performance car is often fitted with a turbocharged engine: air is pumped into the engine to boost its power.

**Electric car** An alternative to a car fueled by gasoline or diesel fuel is an electric car. Instead of an internal combustion engine, the car is fitted with batteries that power an electric motor. The car is “refueled” by recharging its batteries. While electric cars give off less pollution, they use up more electricity produced by power stations.

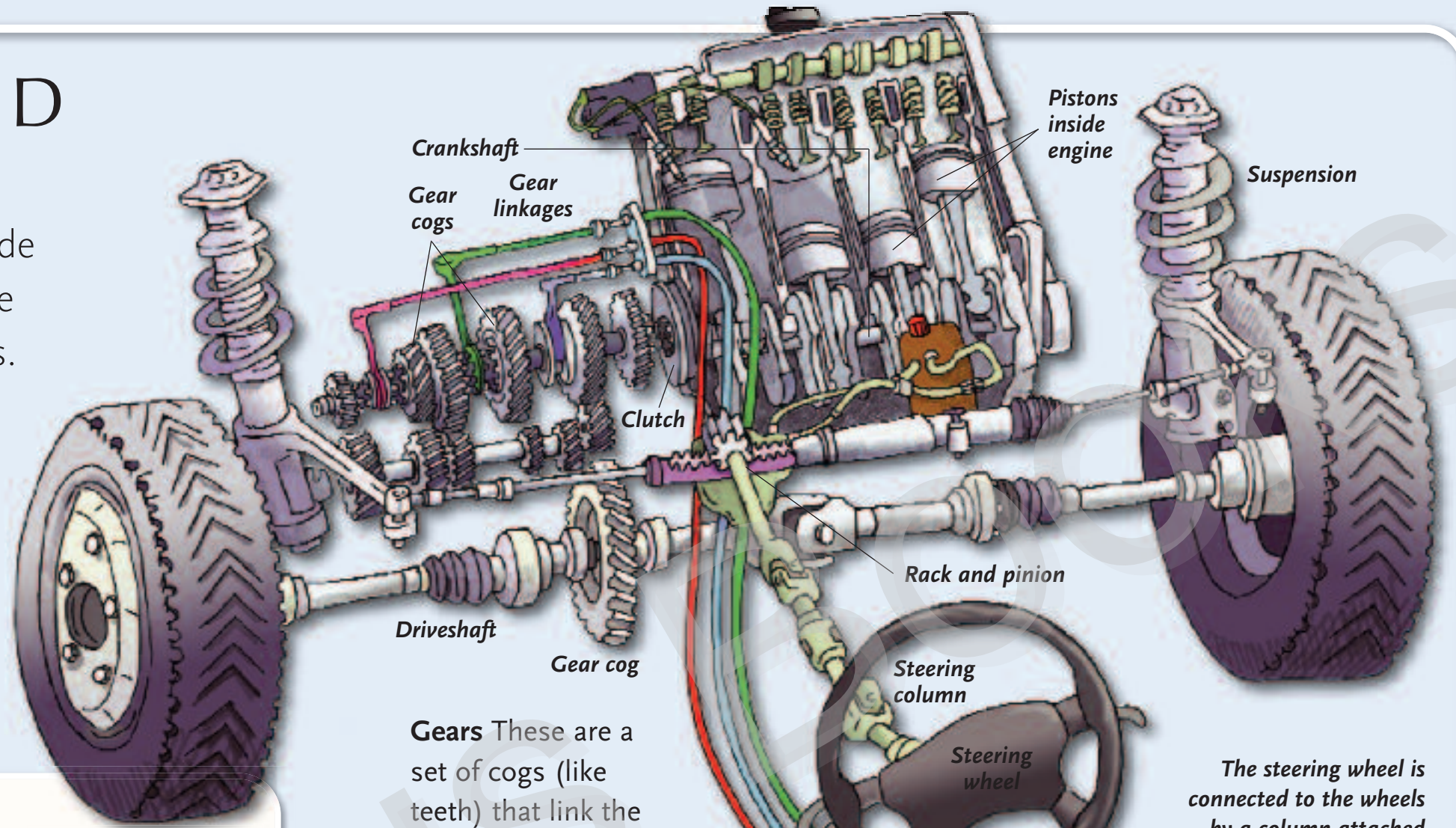


*This is a typical EV (Electric Vehicle). Some owners recharge the batteries using rooftop solar panels.*

*This is a modern performance car. The engine, the same as a type used in light aircraft, is mounted at the rear of the car rather than at the front.*

# MOVING FORWARD

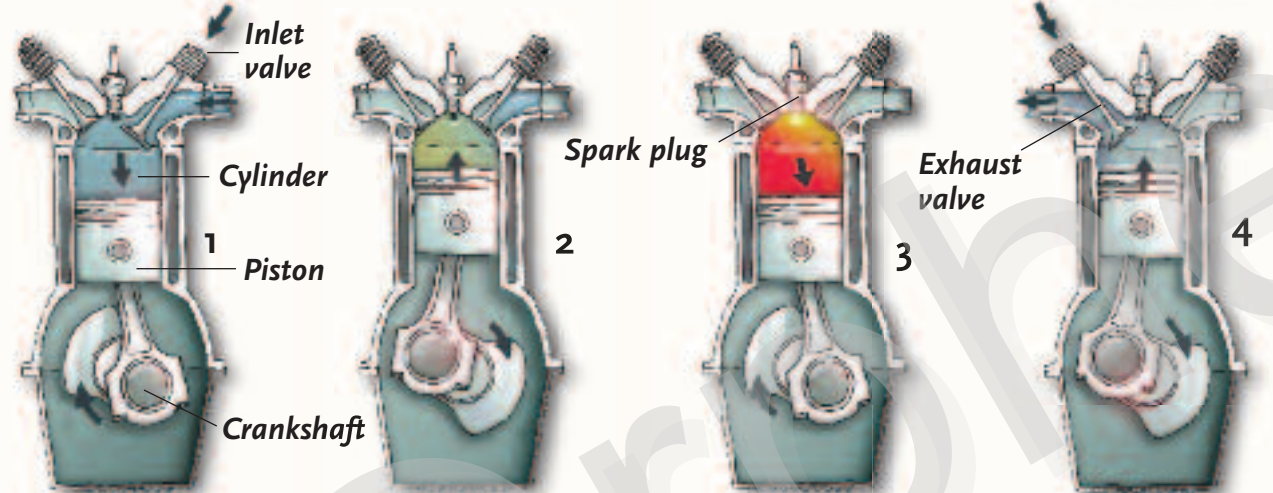
A car engine relies on pistons for its power. They move up and down very quickly inside their cylinders, turning the crankshaft. The crankshaft is connected to the wheels by gears. The wheels are made to turn around, and so the car moves forward (or backward when the car is in reverse gear). The driver controls the car using the gas pedal, which adjusts the car's speed, brake pedal, clutch, steering wheel, and gear stick.



**Gears** These are a set of cogs (like teeth) that link the engine to the wheels. When the driver chooses a low gear, the cogs make the wheels turn slower than the crankshaft. This produces more power at slow speeds. The driver chooses higher gears when less power is needed. To change gear, the driver pushes the clutch in, which disconnects the gears from the engine, and then moves the gear stick.

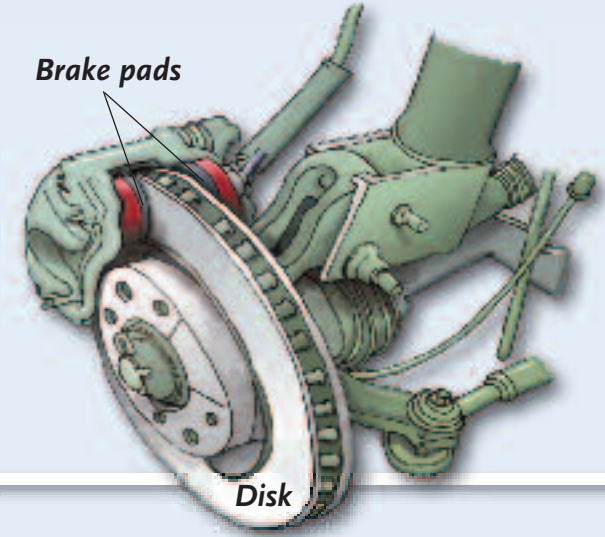
The steering wheel is connected to the wheels by a column attached to a device called a rack and pinion. A small cog wheel, the pinion, connects with a toothed bar, the rack, shifting it to the left or the right.

## THE FOUR-STROKE CYCLE



On the first stroke (1), the piston moves down and the inlet valve opens. A mixture of fuel and air is sucked into the cylinder. The fuel/air mixture is squeezed when the piston completes its second stroke (2). At that moment, a spark ignites it.

The explosion forces the piston down again: the third stroke (3). As the piston rises on the fourth stroke (4), the exhaust valve opens to let out the waste gases. The four-stroke cycle is repeated again and again as the pistons move up and down.



**Brakes** When the driver pushes the brake pedal, two brake pads grip a disk fitted to the inside of each of the car's wheels. These slow the wheels down. The brake pedal is linked to a hydraulic braking system. The force of the driver's foot increases pressure on fluid inside the wheel cylinders. This, in turn, forces pistons to push the brake pads against the disk.