



Technical English
Unit 40
professional english
Engines and motors

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Content

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- A. Types and functions of engines and motors
 - B. Internal combustion engines

A. Types and functions of engines and motors

The term engine usually refers to petrol engines, diesel engines and jet engines(or jets) . In engineering, motor usually means electric motor- but in general language, 'motor' can also refer to petrol and diesel engine. Engines and motors **power** (or **drive**) machines by generating rotary motion – for example, to drive wheels. In jet engines, compressors and turbines rotate to generate **thrust** – pushing force, produced by forcing air from the back of the engine at high velocity.



A jet engine

A. Types and functions of engines and motors

As an engine produces a **couple** - rotate force- the moving parts of the machine it is driving will produce resistance, due to friction and other forces. As a result, **torque** (twisting force) is exerted on the output shaft of the engine. Torque - calculated as a turning moment, in newton meters- is therefore a measure of how much rotational force an engine can exert.

The rate at which an engine can work to exert torque is the **power** of the engine, measured in **watts**. Although engineers normally calculate engine power in watts, the power of vehicle engines is often given in **brake horsepower (bhp)**.

A. Types and functions of engines and motors

This is the power of an engine's output shaft measured in **horsepower (hp)** – a historic measured of power (see Appendix III on page 100).

Note: See the following units for more information: Unit 33 (turning moments), Unit 34 (rotary motion), Unit 35 (power), and Unit 41 (shafts) .

BrE: petrol; AmE: gasoline

BrE: petrol engine; AmE: gasoline engine

B. Internal combustion engines

Petrol and diesel engines are **internal combustion engines**. This means they are driven by the **combustion** (burning) of fuel in enclosed, sealed spaces called **combustion chambers**. In petrol and diesel engines, the combustion chambers are **cylinders** surrounded by a **cylinder block** and closed at the top by a **cylinder head**. Each cylinder contains a **piston**. The number of **piston cylinders** in an engine varies – engine in small motorcycles have only one, while sports car engines may have twelve.

B. Internal combustion engines

Fuel is supplied to each cylinder from a tank. In most engines, the flow of fuel is generated by a pump, which forces it – at high pressure – through **fuel injectors**. These vaporize the fuel, allowing it to mix with air. Using this **mixture** (of fuel and air), most engines function as **four-stroke engines**. This means they work on a **cycle** of four stages – or four **strokes**. A stroke is an upward or downward movement of a piston.

B. Internal combustion engines

1 Induction or intake

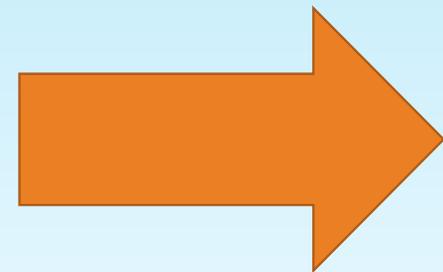
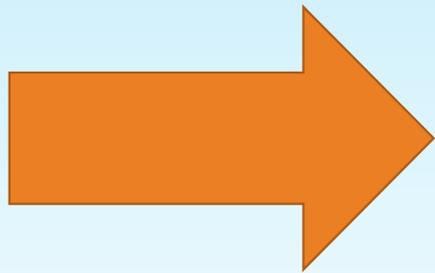
The **intake valve** opens. The mixture enters the cylinder through a **port** (opening) in the cylinder head while the piston moves downwards.



B. Internal combustion engines

2 compression

The **intake valve** closes.
The piston moves upwards, compressing the mixture.



B. Internal combustion engines

3 Power or ignition

The **spark plug** produces a spark, which **ignites** (lights) the mixture. On ignition, the mixture explodes, generating a sudden pressure which forces the piston down.

B. Internal combustion engines

4 Exhaust

The **Exhaust valve** opens, and the piston moves upwards, forcing the **Exhaust gases** – those produced during combustion – out of the cylinder via the exhaust port. The Exhaust valve then closes and the cycle begins again.

The cycle of a four – storke petrol engine

Notes: See exercise 40.2 opposite for an illustration of a cylinder.

See unit 42 for more on **cam, camshaft, connecting rod** and **crankshaft**.

40.1 Complete the text about diesel engines using words from A and B opposite.

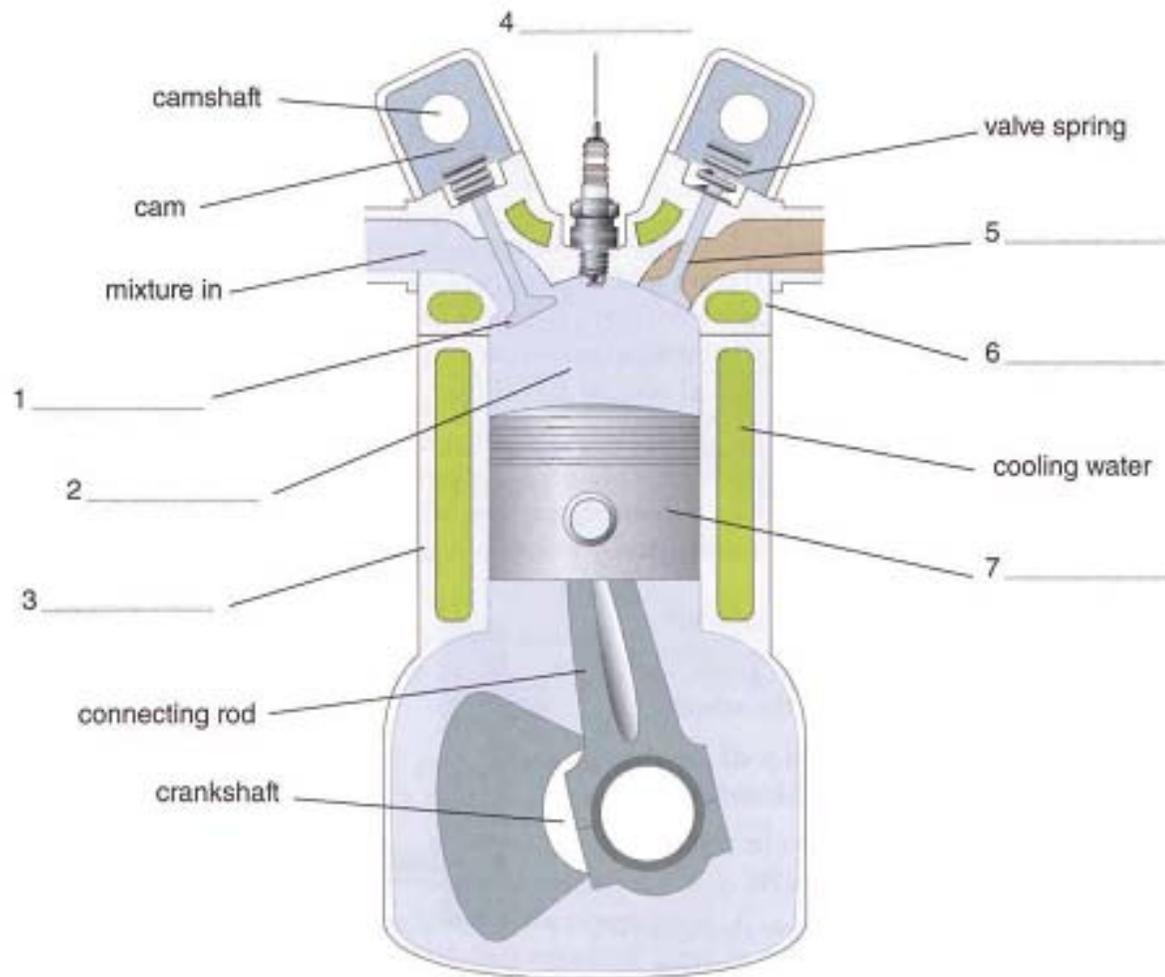
Diesel engines differ from (1) ----- engines in one key respect: they are not fitted with a (2) -----, in each cylinder, to ignite the fuel. This is because when a (3) ----- of diesel and air is compressed inside a hot (4) -----, it will explode spontaneously, without the need for a spark to provide (5) -----.

A diesel engine must therefore work in a way which prevents the diesel from exploding before the piston is at the top of the cylinder. To achieve this, the engine takes in only air during the (6) ----- stage of the cycle. Therefore, during the (7) ----- stage, only air – and not an air – fuel mixture – is pressurized. It is only at that last instant, when full compression has occurred, that the (8) ----- above each cylinder forces vaporized diesel onto the combustion chamber, where it ignites.

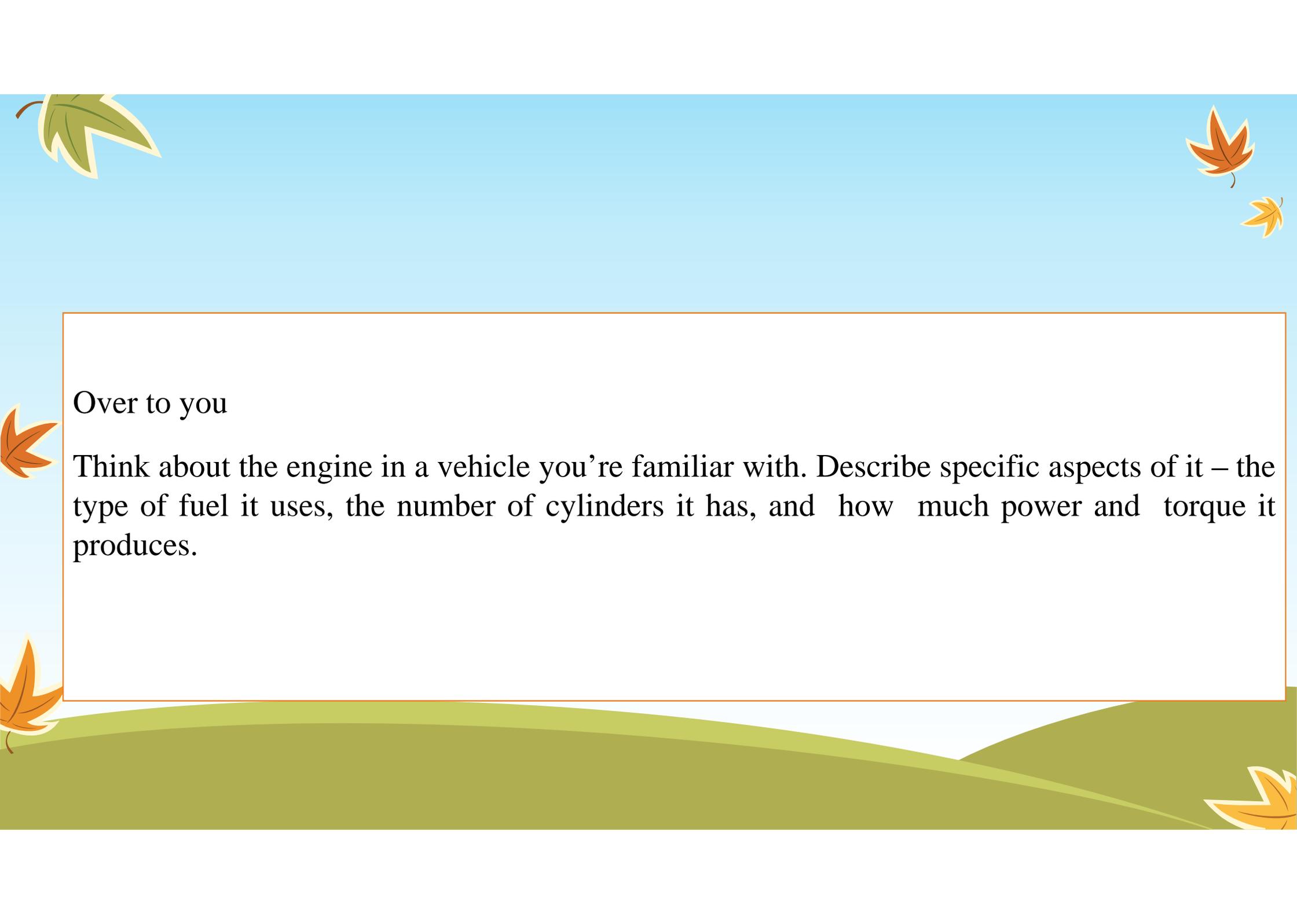
40.1 Complete the text about diesel engines using words from A and B opposite.

Diesel engines operate at lower speeds than petrol engines, making them less suitable for high – speed applications. However, they are more able to (9) ----- heavy vehicles, as they can produce greater amounts of (10) ----- than petrol engines.

40.2 look at the cross – section of an engine, and label it using words and expressions from B opposite.



One cylinder of a four – stroke internal combustion engine



Over to you

Think about the engine in a vehicle you're familiar with. Describe specific aspects of it – the type of fuel it uses, the number of cylinders it has, and how much power and torque it produces.



I see you
got right

Any Questions