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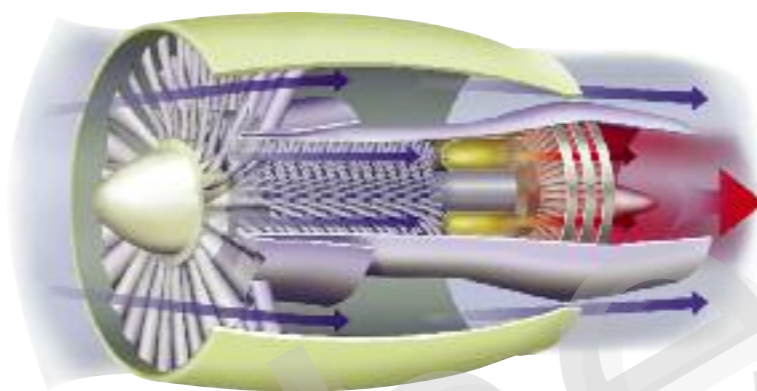
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INTRODUCTION

WHAT would life be like without machines? It would be difficult to travel very far except on horseback. It would take much longer to make things. And can you imagine a world without telephones, televisions or computers? Modern machines make our lives easier and more enjoyable.



SPACE ROCKETS

TO TRAVEL into space, a space rocket must reach a speed of 40,000 kilometres per hour. This is the minimum speed needed to escape the Earth's gravity. Its engines must therefore be both very powerful and able to work without air (there is none in space).

In a rocket engine, two different fuels are mixed together. They make hot gases, which rush out through a nozzle at great speed. This propels the rocket upwards.

A space rocket is made up of separate stages. When the fuel in one stage is burned up, it is jettisoned (cast off into space).

A satellite to be launched into space (the "payload")

Liquid hydrogen fuel tank

Liquid oxygen fuel tank

Rocket engine (second stage)

Liquid oxygen fuel tank

Kerosene fuel tank

Solid-fuel booster engine

Solid-fuel booster engine

Rocket engine (first stage)

SPACE PROBES

It would take a manned spacecraft many years to reach distant planets. To explore worlds such as Jupiter and Saturn, remote-controlled space probes have been launched instead. Fired into space by rockets, they need no engines as there is no air to slow them down. They send back photos of the planets as they fly near them.

The space probe *Cassini* went into orbit around Saturn in 2004. Then a lander was parachuted down to Saturn's moon, Titan.

