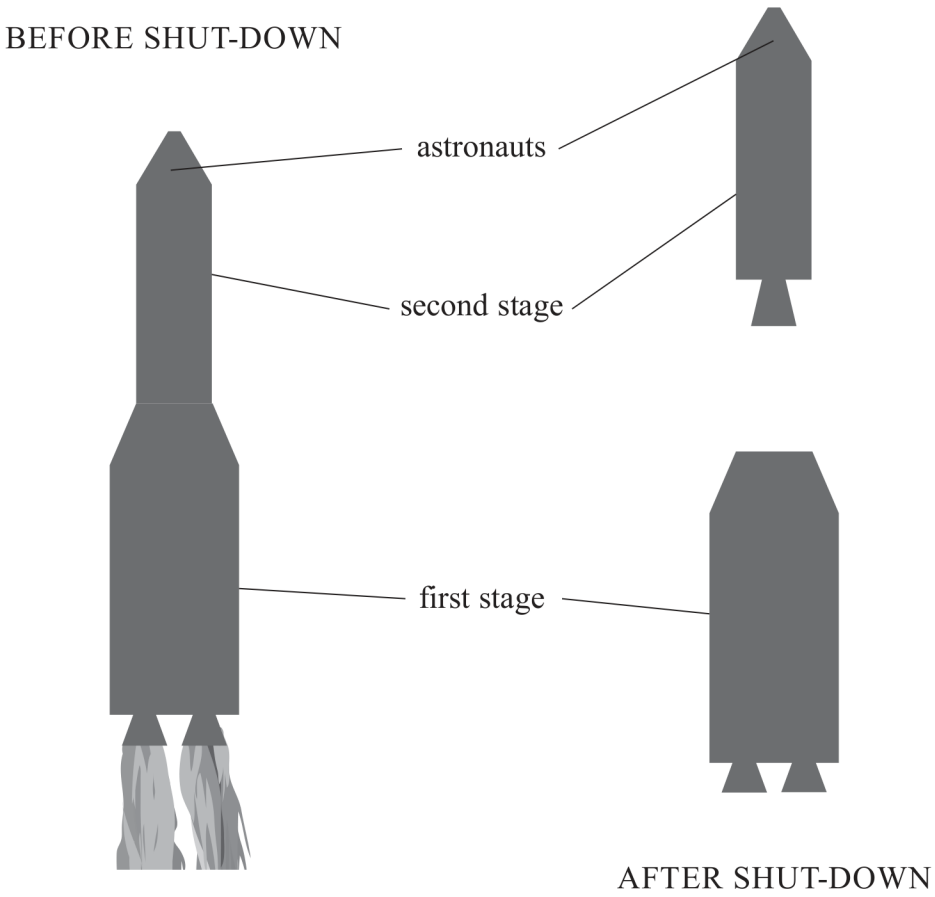
***15** A large spacecraft is made up of several 'stages'. Each stage consists of a rocket motor and a fuel tank. Once a stage has used all its fuel, the rocket motor in that stage shuts down. The stage then disconnects from the spacecraft and falls back to Earth.



As the rocket is rising due to the upward force of the first stage, an astronaut feels himself pushed further and further back, compressing the back of his seat.

When the first stage shuts down, the astronaut is suddenly projected forwards by the seat. The astronaut is held in place by a safety strap.

Explain the effects experienced by the astronaut. You may assume that the force provided by the first stage rocket motor is constant until the moment it shuts down.

(Total for Question 15 = 6 marks)